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THE STATUS OF ACTIVE DEEP MINES IN THE MONONGAHELA RIVER BASIN

Environmental Protection Agency
Wheeling, West Virginia

January 1973

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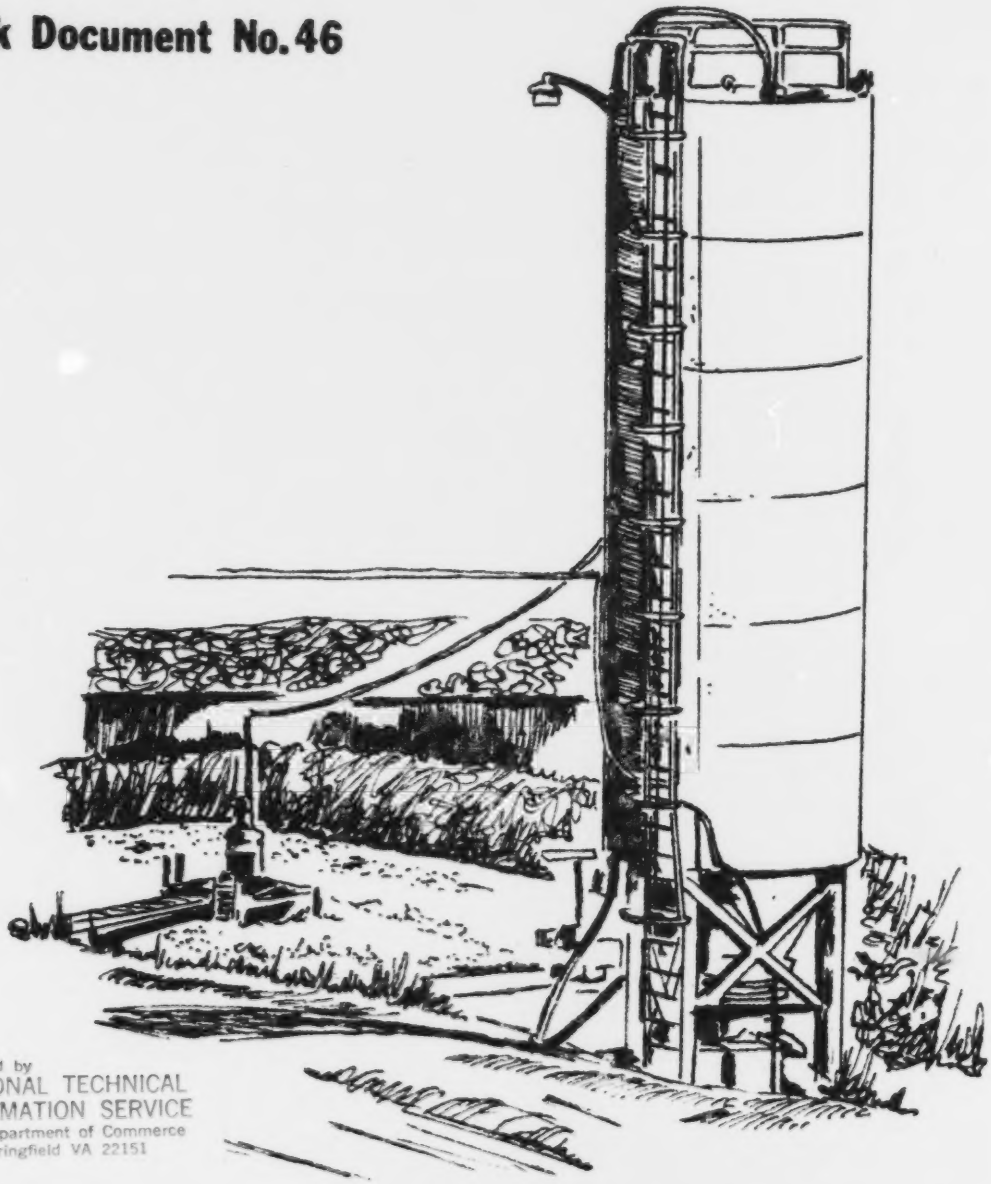
The Status of Active Deep Mines In The Monongahela River Basin

Work Document No. 46



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January 1973

Cover: Typical Mine Drainage Treatment Plant With Lime Storage Tank, Aerator, and Sedimentation Pond

Not in Lab 73-1

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THE STATUS OF ACTIVE DEEP MINES IN THE MONONGAHELA RIVER BASIN

Work Document No. 46

This document has been prepared to record a specific water pollution control activity carried out to date in the furtherance of the water pollution control program being developed in the subject basin. The information contained herein will serve as a ready reference to aid in the planning and development of the program in the basin, for appropriate in-service training of participating personnel, and facilitating program activities with other cooperating groups.

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January 1973

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SUMMARY

The Monongahela Enforcement Conference survey of mines in the Monongahela River basin identified 343 active underground mine sites during 1965-1968. A resurvey of the active underground mines in the basin from November 1971 to December 1972, found only 59 of the original 343 active deep mines still operating. Three additional large scale deep mines were opened in the basin since the 1965-1968 survey. Only a few of the smaller mines were still active while generally the same large mines continued to operate.

Forty-eight active mines produced a discharge at the time of resurvey. The owners or operators of 14 additional active mines reported no discharges. In Pennsylvania, the 23 active discharging deep mines had 45 discharge points, 13 of which had chemical treatment facilities. Only the Hutchison Mine, with two discharges, produced any serious pollution problems in the receiving stream. That mine and the Pennsylvania Department of Environmental Resources are presently in litigation.

In West Virginia, the 25 active discharging deep mines had 112 discharge points. There were eight discharge points receiving chemical treatment. The ten mines in the Christopher and Mountaineer Divisions of Consolidation Coal were responsible for 75 discharges. These Consol mines and two Eastern Associated Coal Corporation mines were investigated in greater detail. The mines in the Christopher Division of Consol caused most of the stream pollution from active deep mines in the basin.

This survey apparently stimulated more rapid installation of treatment facilities in the West Virginia portion of the Monongahela basin.

CONCLUSIONS

1. In general, small-scale commercial coal mining is no longer economical in the Monongahela basin. Most of the 284 mines (83 percent of total active deep mines) which were abandoned since the initial mine inventory in 1965-1968, were small operations.
2. Chemical treatment can remove all visible and most harmful pollutants from acid mine drainage. At eleven of the thirteen mine drainage chemical treatment facilities in the Pennsylvania portion of the basin, all acidity was neutralized, total iron was reduced to less than 3 mg/l and dissolved iron was reduced to less than 1 mg/l.
3. Active deep mines discharging in the Pennsylvania portion of the basin generally caused no acid or iron pollution in the receiving streams.
4. Only a portion of the active deep mines in the West Virginia portion of the basin provided adequate treatment of their discharges. New treatment plants were constructed at several discharges in West Virginia while the resurvey was in progress. Consolidation Coal built treatment plants at Whetstone Portal, Four States and Cunningham Run (all in the Mountaineer Division) as well as at the Loar Borehole and the Bailey Borehole (Christopher Division). The Sears facility was still under construction at the conclusion of the resurvey. The Joanne Mine of Eastern Associated Coal also constructed a new treatment facility at their main borehole.

5. The following mines of the Christopher Division of Consolidation Coal Company caused gross pollution of tributaries to the Monongahela River:

Humphrey No. 7

Purseglove No. 15

Osage No. 3

Arkwright No. 1

INTRODUCTION

In December 1963, a conference at Pittsburgh, Pennsylvania, in the matter of pollution of the interstate waters of the Monongahela River in the States of West Virginia, Maryland, and Pennsylvania was called under provisions of Section 10 of the Federal Water Pollution Control Act. The purpose of this conference was to bring together the State water pollution control agencies, the U. S. Public Health Service, Division of Water Supply and Pollution Control (now the Environmental Protection Agency), and other interested parties to give careful consideration to the acid mine drainage problem and other pollution problems in the Monongahela River basin.

At the 1963 conference, a technical committee was formed. One of the tasks assigned to this committee was to explore the means of abating pollution caused by coal mine drainage. As a direct result, field studies were initiated to locate, sample and describe the sources of all mine drainage pollution in the Monongahela River basin. The field work was conducted by personnel from the Wheeling Field Office of the Environmental Protection Agency.

The conference was reconvened on August 24, 1971 at Pittsburgh, Pennsylvania. At this time, a report was presented which described the survey findings.[1/] A total of 7,002 sites associated with coal mining were located and described.

1/ "Proceedings in the Matter of Pollution in the Interstate Waters of the Monongahela River and its Tributaries-Pennsylvania, West Virginia, Maryland." EPA, August 24, 1971.

During the 1965-1968 survey, it was determined that discharges emanating from active coal mines were responsible for 35 percent of the total net acid load and 40 percent of the total iron load from all mine sources in the Monongahela River basin. The total net acid load from all sources was more than one million pounds per day.

In addition to other recommendations, the State and interstate conferees also recommended that by September 1, 1972, all waters discharged from all active mines in the Monongahela River basin shall meet the following criteria or the State water quality standards, whichever is more restrictive: pH between 6 and 9 standard units; no net acidity, and a total iron concentration of 7 mg/l or less. All values are to be determined by the procedures outlined in the latest edition of Standard Methods.

During September of 1971, a work activity was formulated at the Wheeling Field Office, Surveillance and Analysis Division, Region III, Environmental Protection Agency which involved a program for updating the status of active mining operations in the Monongahela River basin. In the intervening time period between 1965 and 1971, a large number of the smaller coal mines had closed and additional treatment facilities had been installed at some mine sites for upgrading the quality of their discharge. The resurvey of all active mines in the Monongahela River basin was initiated in November 1971 and was completed in December of 1972.

Two separate but related studies were also developed and completed during this same time period. The first of these studies

involved a chemical and biological evaluation of three mine drainage treatment plants operated by the Jones & Laughlin Steel Corporation. Samples for water quality analyses and biological evaluation were collected from the receiving stream above and below the point of final discharge and from the treated and untreated mine water discharge. The results of this study are presented in a separate Work Document Report entitled "A Chemical and Biological Evaluation of Three Selected Mine Drainage Treatment Plants."

The second study was an outgrowth of the initial evaluation of mine drainage data from the Consolidation Coal Company Mines in the West Virginia portion of the basin. These mines were responsible for the major portion of mine drainage pollution from active mines. In order to more accurately access the magnitude of the problem, a cooperative resampling program was initiated with Consolidation Coal Company at their Christopher and Mountaineer Division. This resampling program was also necessary in order to include the new mine drainage treatment plants installed by the Company. Between March 1972 and October 1972, five new mine drainage treatment plants were installed by Consolidation Coal Company. These include the Loar, Whetstone, Four States, Cunningham Run and Bailey treatment facilities. The Sears treatment facility is the sixth such plant and, at this time, is presently under construction.

The results of all the additional sampling at the numerous discharge sites of Consolidation Coal Company in the basin are included in this document.

FORMATION OF MINE DRAINAGE

In the mining process, water drains into the mine and must be removed to keep the mine from flooding. Most water drains into underground mines from ground water storage through the rock intersected by the mine. The mine void serves as a focal point toward which the nearby waters drain. The ground water normally enters the mine over a large area so that its points of entry are difficult to determine. If the mine is located above drainage, the amounts of ground water entering the mine will be smaller, but substantial amounts of surface runoff may find its way into the mine.

As water enters and flows through the mine, it may come in contact with sulfur-bearing minerals which have been exposed to the atmosphere by the mining process. When water dissolves and reacts with these minerals, it becomes acid in character. This mine water then leaves the mine, either by gravity flow or by being pumped, to enter the nearest water course.

The formation of mine acid is dependent upon the presence of three reactants -- water, oxygen, and sulfur-bearing material.

The sulfur-bearing material is present principally in the form of the minerals pyrite and marcasite. These minerals are both iron disulfide, FeS_2, but differ in their crystalline structure. Both minerals are often referred to as "pyrites". These pyrites are contained within the coal seams in bony or shaly materials and in the shale and sandstone strata which are commonly adjacent to coal

beds. The disulfide is quite variable in its physical form. It is frequently present as minute particles disseminated throughout the rock and, at other times, it is present as crystals and crystal aggregates of large size.

During coal mining, iron sulfide minerals are exposed to air and water and are oxidized to ferrous sulfate and sulfuric acid. Flowing water leaches away the ferrous sulfate and acid, forming acid mine water. In the water, the ferrous sulfate may be further oxidized to ferric sulfate which hydrolizes to basic ferric sulfate or ferric hydroxide and additional sulfuric acid.

Although this generally describes the reactions involved, the individual steps of the acid production processes and the influence of numerous variables such as oxygen concentration, inhibitors, reaction water composition, etc., on the reaction rate are not fully understood.

The variety of constituents found in mine drainage are produced by secondary reactions of sulfuric acid with compounds in adjacent rocks in the mine and along the stream valleys, and with various organic materials which may be encountered in the drainage environment. Such secondary reactions produce concentrations of aluminum, manganese, magnesium, calcium, sodium, and other constituents commonly found in the drainage water.

There is evidence to indicate the micro-organisms play a role in the formation of mine acid. There are conflicting opinions, however, among researchers as to the importance of the participation of

micro-organisms in acid formation. Several bacterial species have been isolated from acid mine waters but the extent of their role in the acid reactions is still controversial among observers.

Since the supply of air and water is seldom lacking in the mine environment, the rate at which the acid is formed is a direct function of the amount of exposed sulfuric material. Consequently, the problem is aggravated with the opening of new mine tunnels and the abandonment of mined out areas in each operating mine. Caving and roof falls in abandoned mines increases the surface area exposed, thus increasing their acid forming potential.

Waste materials are often piled outside the mine and these also represent additional surface area exposed to the elements. This "gob" material is composed of impure coal, roof shale, and other high sulfur rock. Because of the surface area involved and the sulfur content, the acid contribution from such piles may be particularly high. The use of this material for road surfaces used to be common practice, but is now discouraged in most states.

Many mine discharges are alkaline rather than acid and seldom create serious water pollution problems. Such alkaline discharges can be found throughout the bituminous coal fields but in the fields of western Pennsylvania, Ohio and northern West Virginia such discharges are the exception.

TREATMENT OF MINE DRAINAGE

The treatment of mine drainage encompasses a broad array of methods from purification by freezing to neutralization by numerous chemical compounds. In reality, methods in present use rarely rely on the somewhat exotic experimental procedures but rather rely on chemical neutralization. In the neutralization process, an alkali is mixed with acid waters to neutralize the acids and to precipitate the contaminating metal salts which can then be separated by sedimentation. The metal salts in the mine drainage are separated because their solubility decreases with the increasing pH value resulting from the addition of the neutralizing agent.

Mine drainage treatment facilities are generally dependent upon the use of hydrated lime as a neutralizing agent. In addition to increasing the pH value and decreasing the acidity concentration, lime treatment will remove aluminum and manganese if the proper pH level is attained. The resultant calcium sulfate will increase the hardness of the water until its solubility is reached and, at that point, it too will precipitate. The reaction of ferrous iron and lime is the limiting factor in treating acid mine drainage. The oxidation rate of the ferrous iron is dependent upon several variables but is slowest at low pH levels.

Lime addition, followed by aeration (optional) and settlement, was the general method employed by mines in the Monongahela River basin. The lime is slurried for better mixing properties prior to adding it to the major volume of water requiring treatment. This

mixture is often aerated for better oxidation prior to settlement. The settlement time is dependent upon the chemical characteristics of a given mine drainage discharge. During the settlement process, the iron and other metallic salts are precipitated and the supernatant is discharged to a nearby water course or directed to another holding pond for additional retention time. There are several sites in the basin where only iron, and not acidity, is a problem in the mine effluent. In such cases, aeration and settlement may be sufficient to adequately reduce an initial high iron level.

Methods such as ion exchange are available for such purposes as producing a marketable potable water supply from coal mine drainage. However, costs for such methods of treatment are not generally applicable for normal mine drainage treatment operations.

SURVEY DESCRIPTION

The field survey crew was composed of personnel from the Wheeling Field Office of the EPA. Generally, the crew was limited to two individuals with some substitutions as required by other work commitments. All personnel involved in the study have had considerable experience with mine drainage field techniques and sampling procedures as associated with coal mine operations.

The initial field effort was directed toward the active mines in the Pennsylvania portion of the basin. In general, the mines were visited by sub-basin regions as established during the first Monongahela River survey conducted from January 1965 to May 1968. The resurvey of the active operations was begun in Pennsylvania on November 30, 1971 and finished in West Virginia on December 19, 1972.

During the 1965-1968 survey, a total of 561 active coal mine operations were located throughout the 7,384 square mile drainage area of the Monongahela River. Due to the rapidly expanding nature and mobility of surface mine operations, it was decided at the outset of the study that only underground mines would be considered in the new survey.

The summary report, prepared at the conclusion of the 1965-1968 mine drainage inventory, listed 343 active underground mine sites in the Monongahela River basin.[2] During the resurvey period, each of these sites was visited in order to determine the present operational status and primarily the status of any mine drainage discharge emanating from each of the active mine sites.

[2] Ibid., Table 1.

At each active mine, the field personnel explained the purpose of the survey and asked permission to sample each point where that particular mine produced a discharge. In general, the operators were quite cooperative and no significant problems were encountered during the period of study.

A letter of request was submitted to the appropriate official of Consolidation Coal Company prior to initiation of field activities in the West Virginia portion of the basin. This was done in order to more easily coordinate the sampling program between the numerous mines operated by the Company in the general area of Morgantown, West Virginia. Contact was made with several other West Virginia mining companies prior to the initial visit.

There were no active underground operations in the Maryland portion of the Monongahela River basin.

The original list of 343 active sites provided the basis for the resurvey. There was no specific attempt to locate new operations developed during the intervening years between surveys. However, as any new mines were encountered during the field travels, they were included in the inventory. Any new operations of the larger mining companies were included during inventory of the parent mine complex.

RESULTS OF SURVEY

Fifty-nine of the 343 active underground mines of the 1965-1968 survey were still in operation during the 1971-1972 survey. Only three additional mines were opened since the earlier survey, and these were large mines. Only a few of the smaller operations were still active while generally the operational status of the larger mines had remained unchanged. Forty-eight of these active mines produced drainage at the time of inspection. A total of 157 discharges were sampled at these 48 mines. The locations of these mine drainage discharge sites are shown in Figure 1 and the sample data is shown in Table 1. The sample numbers of Table 1 are shown next to the discharge location in Figure 1. The remaining 14 active mines were dry, as reported by their respective owners or operators. These active dry mines are listed in Table 2.

Generally, the active mines were located to the west of the Monongahela River. The greatest number of active mine discharges from any coal company came from the Consolidation Coal Company. mines between Morgantown and Fairmont, West Virginia. This cluster of discharge points contrasts with the widely scattered discharge locations of the mines in Pennsylvania. In Pennsylvania, the mines have generally consolidated their discharges to one or two locations so that the water quality can be more easily monitored or so that fewer treatment facilities are required. The Consolidation Coal Co. was reportedly beginning an effort to eliminate or combine mine water discharges in West Virginia while this survey was being conducted.

OHIO RIVER
ALLEGHENY RIVER
GREATER PITTSBURGH
ALLEGHENY
TURTLE CREEK
IRWIN
JEANNETTE
MC KEESPORT
CLAIRTON
GREENSBURG
YOUGHIOGHENY RIVER
WESTMORELAND
SEWICKLEY CREEK
YOUNGWOOD
MONONGAHELA RIVER
DONORA
MONESSEN
CHARLEROI
PIGEON CREEK
WASHINGTON
MOUNT PLEASANT
SCOTTDALE
JACOBS CREEK
CALIFORNIA
MARIANNA
MONONGAHELA RIVER
REDSTONE CREEK
BROWNSVILLE
CONNELSVILLE
INDIAN CREEK
SOMERSET
LAUREL HILL CREEK
TENMILE CREEK
WAYNESBURG
FAYETTE
UNIONTOWN
ROCKWOOD
CASSELMAN RIVER
GREENE
MASONTOWN
WHITELEY CREEK
GEORGES CREEK
CONFLUENCE
MEYERSDALE
DUNKARD CREEK
POINT MARION
POUGHKEEPSIE RESERVOIR
PENNSYLVANIA
WEST VIRGINIA
PENNSYLVANIA
MARYLAND
LAKE LENN
CHEAT RIVER
MONONGALIA
MORGANTOWN
BIG SANDY CREEK
BEAR CREEK
DAN RUN CREEK
BUFFALO CREEK
MONONGAHELA RIVER
YOUGHIOGHENY RIVER
GARRETT
MARION
FAIRMONT
KINGWOOD
TERRA ALTA
MARYLAND
WEST VIRGINIA
DEEP CREEK LAKE
PRESTON
OAKLAND
TYGART RIVER
N

FIGURE 1

ACTIVE UNDERGROUND MINE DISCHARGE SITES IN THE MONONGAHELA RIVER BASIN 1972

KEY

● ACTIVE UNDERGROUND MINE DISCHARGE LOCATIONS

Table 1

DEEP MINE INVENTORY DATA

Monongahela River Basin

1972

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb
Consolidation Coal Co., Christopher Division, Arkwright #1 Mine - Pittsburgh Coal									
Arkwright Prep.Plant	M-163	OYJ-142	7.2	87	157			95	
Granville Refuse Pile	M-110		5.5	7,150	2,574	-	-	3,000	1
Martin Hollow Refuse	M-113		4.8	3,875	1,070	1,000	0	1,000	
Hess Borehole	M-116	126	2.6	5,030	6,036	1,000	0	1,000	1
Laurel Point		128	-	-	-	-	-	-	
Loar Borehole	M-111	147	5.6	3,410	16,368	750	0	750	3
Snyder Borehole	M-112	131	6.2	200	4,080	140	0	140	2
Lynch Borehole	M-86	112	2.6	6,160	1,552	1,600	0	1,600	
Stewarts Run Borehole	M-87	139	6.5	765	1,836	500	200	700	1
Hagans Portal	M-88	105	7.8	-79	-71	1.0	0	1.0	
Little Indian Creek Borehole	M-85	146	2.7	5,315	12,756	1,400	0	1,400	3
Booth Borehole	M-84	127	4.7	2,210	36,465	750	0	750	12

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Table 1

DEEP MINE INVENTORY DATA

Monongahela River Basin

1972

Net Acidity		IRON				Sulfate		Flow	Receiving	
		Dissolved	Suspended	Total						
mg/l	lb/day	mg/l	mg/l	mg/l	lb/day	mg/l	lb/day	mgd	Stream	State
ight #1 Mine - Pittsburgh Coal										
87	157			95	171			0.216	Monongahela River	W.Va.
7,150	2,574	-	-	3,000	1,080	9,500	3,420	0.043	Dents Run	W.Va.
3,875	1,070	1,000	0	1,000	276	5,200	1,435	0.033	Dents Run	W.Va.
5,030	6,036	1,000	0	1,000	1,200	5,200	6,240	0.144	Trib.to Dents Run	W.Va.
-	-	-	-	-	-		-	none	Dents Run - now dry	W.Va.
3,410	16,368	750	0	750	3,60[illegible]	4,950	23,760	0.575	Dents Run - now treated	W.Va.
200	4,080	140	0	140	2,856	875	17,850	2.45	Dents Run	W.Va.
6,160	1,552	1,600	0	1,600	403	11,500	2,898	0.030	Little Indian Creek	W.Va.
765	1,836	500	200	700	1,680	5,375	12,900	0.288	Stewarts Run	W.Va.
-79	-71	1.0	0	1.0	1	90	81	0.108	Indian Creek	W.Va.
5,315	12,756	1,400	0	1,400	3,360	[illegible],100	14,640	0.298	Little Indian Creek	W.Va.
2,210	36,465	750	0	750	12,375	4,050	66,825	1.98	Little Indian Creek	W.Va.

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Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/day
Consolidation Coal Co., Christopher Division, Purseglove #15 Mine - Pittsburgh Coal									
Purseglove Slope	M-96	OYJ-109	2.2	3,450	1,449	500	0	500	210
Jove Drain Borehole	M-115	122	3.0	3,510	3,159	750	0	750	675
Main West Borehole	M-97	113	3.4	1,660	398	30	0	30	7
Wales Run Shaft	M-103	143	2.7	5,675	681	1,000	0	1,000	120
Brewer Borehole	M-102	145	3.0	2,825	23,730	150	0	150	1,260
Lemley Shaft	M-98	-	5.5	-98	-17	0.5	0	0.5	0
Core Shaft	M-90	144	7.8	-298	-358	0.5	0.5	1.0	1
Fetty Borehole	M-92	106	10.7	-451	-6,494	0.3	0.2	0.5	7
Muffly Shaft	M-104	138	7.9	L.A.	-	5	0	5	-
No. 8 Shop	M-101	-	7.5	-148	-355	1.0	0	1.0	2
Consolidation Coal Co., Christopher Division, Osage #3 Mine - Pittsburgh									
Valotto Borehole	M-114	124	5.3	1,900	684	200	0	200	72
6 Right Borehole	M-117	125	2.8	5,565	10,017	1,000	0	1,000	1,800
Dolls Run Portal	M-99	140	7.9	122	29	0.5	0	0.5	0
Lemley Siding	M-100	135	6.2	503	604	62.0	0	62.0	74
Pedlar Run	M-89	133	7.6	-18	-2	0.5	11.5	12.0	1
Statler Run	M-91	134	8.4	-349	-42	0.2	0.3	0.5	0

Table 1 (continued)

dity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/day	Sulfate mg/l	Sulfate lb/day	Flow mgd	Receiving Stream	State
5 Mine - Pittsburgh Coal									
1,449	500	0	500	210	4,000	1,680	0.050	Scotts Run	W.Va.
3,159	750	0	750	675	4,425	3,983	0.108	Trib. to Scotts Run	W.Va.
398	30	0	30	7	3,000	720	0.029	Trib. to Scotts Run	W.Va.
681	1,000	0	1,000	120	6,875	825	0.014	Wades Run	W.Va.
23,730	150	0	150	1,260	4,275	35,910	1.01	Trib. to Wades Run	W.Va.
-17	0.5	0	0.5	0	240	43	0.022	Dolls Run to Dunkard Cr.	W.Va.
-358	0.5	0.5	1.0	1	260	312	0.144	Dolls Run to Dunkard Cr.	W.Va.
5,494	0.3	0.2	0.5	7	2,625	37,800	1.73	Dunkard Creek	W.Va.
-	5	0	5	-	95	-	-	Dunkard Creek	W.Va.
-355	1.0	0	1.0	2	320	768	0.288	Wades Run	W.Va.
- Pittsburgh									
684	200	0	200	72	3,150	1,134	0.043	Trib. to Dents Run	W.Va.
10,017	1,000	0	1,000	1,800	6,250	11,250	0.216	Trib. to Dents Run	W.Va.
29	0.5	0	0.5	0	85	20	0.029	Dolls Run	W.Va.
604	62.0	0	62.0	74	4,000	4,800	0.144	Dolls Run	W.Va.
-2	0.5	11.5	12.0	1	625	75	0.014	Pedlar Run to Dunkard	W.Va.
-42	0.2	0.3	0.5	0	225	27	0.014	Long Run to Dunkard Cr.	W.Va.

Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	
Consolidation Coal Co., Christopher OYJ-Division, Humphrey No. 7 Mine, Pittsburgh Coal									
Preparation Plant	M-165	141	7.4			35	5	40	
Maidsville Portal	M-109	-	6.2	1,485	1,782	250	0	250	3
4100 Borehole	M-108	111	3.9	3,275	3,930	500	0	500	6
114+00 Borehole	M-118	110	3.5	1,470	1,182	-	-	100	
Bowlby Mills No.1 Pump	M-106	129	5.2	1,690	16,224	500	0	500	4,8
Bowlby Mills No.2 Pump	M-107	129	5.8	1,235	44,460	500	0	500	18,0
No. 1 Shaft	M-105	132	7.2	138	17	1.0	9.0	10.0	
Mt. Morris Shaft	M-120	-	7.8	0	0	1.0	0	1.0	
Calvin Run Borehole	M-95	137	8.3	-147	-53	0.3	0.2	0.5	
Bowers Portal	M-94	136	8.3	-217	-52	0.3	0	0.3	
Eddy Borehole	M-93	108	8.3	-543	-5,213	0.2	0.3	0.5	
Consolidation Coal Co., Mountaineer Division, No. 93 Mine - Pittsburgh Coal									
Dakota Borehole	M-53	205	5.8	-275	-1,155	50.0	0	50.0	21
Baxter Borehole	M-54	206	5.5	440	1,357	55	0	55	17
No. 93 Refuse Pile	M-52	210	5.3	345	166	40	10	50	2
6-South Borehole	M-51	204	3.0	2,170	6,770	55	0	55	17

Table 1 (continued)

et Acidity		IRON						Flow	Receiving	
		Dissolved	Suspended	Total		Sulfate				
/l	lb/day	mg/l	mg/l	mg/l	lb/day	mg/l	lb/day	mgd	Stream	State
hrey No. 7 Mine, Pittsburgh Coal										
		35	5	40	7			0.022	Trib. to Monongahela R.	W.Va.
85	1,782	250	0	250	300	1,400	1,680	0.144	Trib.to Robinson Run	W. Va
75	3,930	500	0	500	600	3,825	4,590	0.144	Trib. to Robinson Run	W.Va.
70	1,182	-	-	100	80	1,710	1,375	0.096	Trib. to Robinson Run	W.Va.
90	16,224	500	0	500	4,800	1,890	18,144	1.15	Trib. to Robinson Run	W.Va.
35	44,460	500	0	500	18,000	1,755	63,180	4.32 Max.	Trib. to Robinson Run	W.Va.
38	17	1.0	9.0	10.0	1	1,960	235	0.014	Robinson Run	W.Va.
0	0	1.0	0	1.0	0	90	13	0.017	Dunkard Creek	Pa.
47	-53	0.3	0.2	0.5	0	550	198	0.043	Trib. to Calvin Run to Dunkard Creek	Pa.
17	-52	0.3	0	0.3	0	500	120	0.029	Shannon Run to Dunkard Cr.	Pa.
43	-5,213	0.2	0.3	0.5	5	2,475	23,760	1.15	Dunkard Creek	Pa.
ine - Pittsburgh Coal										
75	-1,155	50.0	0	50.0	210	1,750	7,350	0.505	Hawkinberry Run to Mon. R.	W.Va.
40	1,357	55	0	55	170	3,600	11,102	0.370	Trib. to Mon. River	W.Va.
45	166	40	10	50	24	1,380	662	0.058	Monongahela River	W.Va.
70	6,770	55	0	55	172	2,950	9,204	0.374	Trib. to Pharoah Run (now dry)	W.Va.

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Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l
Balcar Borehole	M-49	OYJ-209	4.3	950	2,964	55	0	55
Stewarts Run Borehole	M-48	203	4.1	735	3,245	50	5	55
Hagan Shaft	M-50	202	6.9	-126	-266	5	5	10
Consolidation Coal Co., Mountaineer Division, Four State No. 20 Mine, Pittsburgh Coal								
Refuse Pile	M-63	187	3.4	1,830	3,294	55	0	55
Main Shaft Pump	M-64	-	3.5	4,430	8,399	55	0	55
Whetstone Shaft	M-80	188	8.0	-17	-20	5	0	5
Consolidation Coal Co., Mountaineer Division, Williams No. 98 Mine - Pittsburgh Coal								
Barnes Pump	M-66	197	2.5	1,000	1,020	52	0	52
South Side Slate Dump	M-67	201	6.1	465	457	52	0	52
Nutter Run Slate Dump	M-68	-	6.7	46	118	30	5	35
Levi Moore Treatment Plant	M-69	194	10.1	-64	-230	0.0	5.0	5.0
Long Run Borehole	M-65	198	6.4	350	189	52	0	52
Upper Coal Lick Shaft	M-77	199	5.2	520	686	150	225	375
Edgell Treatment Plant	M-76	195	7.1	-81	-972	5	0	5

Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON lb/day	Sulfate mg/l	Sulfate lb/day	Flow mgd	Receiving Stream	State
950	2,964	55	0	55	172	2,650	8,268	0.374	Trib. to Indian Creek	W.Va.
735	3,245	50	5	55	243	2,800	12,362	0.53	Stewarts Run	W.Va.
-126	-266	5	5	10	21	1,350	2,851	0.250	Indian Creek	W.Va.
ur State No. 20 Mine, Pittsburgh Coal										
1,830	3,294	55	0	55	99	3,675	6,615	0.216	Tevebaugh Creek (now treated)	W. Va.
4,430	8,399	55	0	55	104	12,250	23,226	0.228	Tevebaugh Creek (now treated)	W.Va.
-17	-20	5	0	5	6	95	112	0.141	Whetstone Creek (newly installed treatment plant)	W.Va.
lliams No. 98 Mine - Pittsburgh Coal										
1,000	1,020	52	0	52	53	1,600	1,632	0.122	Bingaman Creek	W.Va.
465	457	52	0	52	51	690	679	0.118	Bingaman Creek	W.Va.
46	118	30	5	35	90	900	2,311	0.308	Bingaman Creek	W.Va.
-64	-230	0.0	5.0	5.0	18	1,160	4,176	0.432	Bingaman Creek	W.Va.
350	189	52	0	52	28	1,250	675	0.065	Long Run to Bingaman Creek	W.Va.
520	686	150	225	375	495	1,250	1,650	0.158	Coal Lick	W.Va.
-81	-972	5	0	5	60	2,250	27,000	1.44	Bingamam Creek	W.Va.

Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/
Consolidation Coal Co., Mountaineer Division, Loveridge No. 22 Mine - Pittsburgh Coal									
Flat Run Borehole (Dudley Shaft)	M-82	ÔYJ-192	6.6	-89	-102	5	0	5	
Flat Run Portal (Flat Shaft)	M-81	193	6.9	-75	-87	10	10	20	
Sugar Run Shaft	M-59	189 & 190	7.1	-434	-417	0	5	5	
Refuse Pile @ Prep. Plant	M-60		3.3	845	375	50	5	55	
South Refuse Pile	M-61	-	4.4	730	307	50	0	50	
Refuse Pile @ head of Sugar Run	M-62	-	3.6	1,515	727	15	5	20	
Harvey Run Shaft	M-58	191	7.2	-68	-78	0	0	0	
Consolidation Coal Co., Mountaineer Division, Robinson Run No. 95 Mine - Pittsburgh Coal									
Mine A. Borehole	M-73	207	3.6	495	446	90	0	90	
Mine A Fan Portal	M-70	208	3.6	365	219	50	0	50	
Refuse Pile	M-71	184	5.8	-7	-4	50	0	50	
Main West Borehole	M-72	214	6.7	-36	-39	1.0	0	1.0	
Shinns Run Shaft	M-75	212	7.6	-221	-127	0	0	0	
Big Indian Run Shaft	M-78	211	7.6	-202	-121	2.0	0	2.0	

Table 1 (continued)

Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/day	Sulfate mg/l	Sulfate lb/day	Flow mgd	Receiving Stream	State
ridge No. 22 Mine - Pittsburgh Coal										
-89	-102	5	0	5	6	2,625	3,024	0.138	Dudley Fork	W.Va.
-75	-87	10	10	20	23	3,250	3,744	0.138	Flat Run	W.Va.
-434	-417	0	5	5	5	2,875	2,760	0.115	Sugar Run	W.Va.
845	375	50	5	55	24	3,375	1,499	0.053	Sugar Run	W.Va.
730	307	50	0	50	21	1,935	813	0.050	Sugar Run	W.Va.
1,515	727	15	5	20	10	125	60	0.057	Sugar Run	W.Va.
-68	-78	0	0	0	0	90	104	0.138	Harvey Run	W.Va.
nson Run No. 95 Mine - Pittsburgh Coal										
495	446	90	0	90	81	1,295	1,166	0.108	Robinson Run	W.Va.
365	219	50	0	50	30	860	516	0.072	Robinson Run	W.Va.
-7	-4	50	0	50	29	1,440	847	0.070	Robinson Run	W.Va.
-36	-39	1.0	0	1.0	1	260	281	0.130	Robinson Run	W.Va.
-221	-127	0	0	0	0	255	147	0.069	Robinson Run	W.Va.
-202	-121	2.0	0	2.0	1	30	18	0.072	Big Indian Run	W.Va.

Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/day	m
Oakdale Portal	M-79	OYJ-222	8.2	-378	-91	5.0	0	5.0	1	
Cunningham Run (Main North)	M-74	213	4.0	405	243	75	0	75	45	2,6
Consolidation Coal Co., Mountaineer Division, Consol No. 9 - Pittsburgh Coal										
Refuse Pile	M-55		5.7	220	106	50	0	50	24	1,4
Talkington Borehole	M-56		3.3	815	342	10	10	20	8	2,8
Athas Run Borehole	M-57		6.9	-22	-3	0	0	0	0	
Mods Run Borehole	M-83		7.2	-95	-28	9	1	10	3	4
Consolidation Coal Co., Blacksville Division, No. 1 Mine, Pittsburgh Coal										
Production Shaft	M-123	116	7.5	-442	-387	-	-	0.5	0	8
Service Shaft	M-124	117	6.8	-1,650	-257	-	-	0.5	0	16
Kings Run Shaft	M-125		7.6	-294	-39	0.5	0	0.5	0	10
Consolidation Coal Co., Blacksville Division, No. 2 Mine - Pittsburgh Coal										
Production Shaft	M-126	120	7.2	-514	-308	0.5	0	0.5	0	20
Service Shaft	M-127	118	7.2	21	3	-	-	0.1	0	3
Carpenter Shaft	M-121		7.4	-484	-755	1.0	3.0	4.0	1	3
Brenner Shaft	M-122	130	8.3	-51	-8	0.5	0	0.5	0	5

Table 1 (continued)

dity lb/day	IRON Dissolved mg/l	Suspended mg/l	Total mg/l	Total lb/day	Sulfate mg/l	Sulfate lb/day	Flow mgd	Receiving Stream	State
-91	5.0	0	5.0	1	50	12	0.029	Bingaman Creek	W.Va.
243	75	0	75	45	2,870	1,722	0.072	Cunningham Run	W.Va.
Pittsburgh Coal									
106	50	0	50	24	1,485	713	0.202	Dunkard Mill Run	W.Va.
342	10	10	20	8	2,800	1,176	0.050	Dunkard Mill Run	W.Va.
-3	0	0	0	0	60	8	0.017	Dunkard Mill Run	W.Va.
-28	9	1	10	3	420	126	0.036	Mods Run	W.Va.
ittsburgh Coal									
-387	-	-	0.5	0	85	74	0.105	Dunkard Creek	W.Va.
-257	-	-	0.5	0	165	26	0.019	Dunkard Creek	W.Va.
-39	0.5	0	0.5	0	100	16	0.019	Kings Run	W.Va.
ittsburgh Coal									
-308	0.5	0	0.5	0	200	120	0.072	Dunkard Creek	W. Va.
3	-	-	0.1	0	30	5	0.019	W.Va. Fork to Dunkard Creek	W.Va.
-755	1.0	3.0	4.0	1	35	5	0.019	Dunkard Creek	Pa.
-8	0.5	0	0.5	0	50	8	0.019	Trib. to Dunkard Cr.	Pa.

A

Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb
Consolidation Coal Co., Partnership Company-Mathies Coal Co., Mathies Mine - Pittsburgh Coal									
No. 2 Pitmouth	M-24		7.4	-102	-16	3.0	5.6	8.6	
Mingo Treatment Facility	M-25		9.3	-65	-200	0.0	2.6	2.6	
Thomas Shaft Facility	M-26		7.4	-366	-1,524	0.0	0.4	0.4	
Consolidation Coal Co., Pittsburgh Coal Company Division, Hutchison Mine - Pittsburgh Coal									
Herminie Deep Well	M-161		6.4	-37		85	10	95	
(Pumps adjacent to preparation plant)	M-162		3.3	390		85	145	230	
Bethlehem Mines Corporation, Ellsworth No. 51 Mine - Pittsburgh Coal									
Midway	M-6	OYJ-277	6.3	-49	-408	1.0	0	1.0	
BETHLEHEM MINES CORPORATION, Somerset No. 60 Mine - Pittsburgh Coal									
Preparation Plant Area	M-7	275	7.4	-496	-345	0.0	0.5	0.5	
Bethlehem Mines Corporation, Marianna No. 59 Mine - Pittsburgh Coal									
Preparation Plant Area	M-8	276	6.4	-39	-47	0.0	0.5	0.5	
Bethlehem Mines Corporation, Bethlehem No. 41 Mine - Pittsburgh Coal									
Dunkard Mill	M-138	279 (002)	7.6	-345	-1,724	0.3	1.7	2.0	
Falls Run Discharge	M-139	279 (001)	7.2	-101	-273	1	1	2	

Table 1 (continued)

B

Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/day	Sulfate mg/l	Sulfate lb/day	Flow mgd	Receiving Stream	State
Coal Co., Mathies Mine - Pittsburgh Coal										
-102	-16	3.0	5.6	8.6	1	1,250	195	0.018	Froman Run to Mingo Run	Pa.
-65	-200	0.0	2.6	2.6	8	2,625	8,096	0.370	Mingo Run	Pa.
-366	-1,524	0.0	0.4	0.4	2	1,300	5,413	0.500	Peters Creek	Pa.
sion, Hutchison Mine - Pittsburgh Coal										
-37		85	10	95		1,950			Little Sewickley Creek	Pa.
390		85	145	230		1,800		5.0 total	Sewickley Creek	Pa.
Pittsburgh Coal										
-49	-408	1.0	0	1.0	8	960	7,995	1.00	S. Branch Pigeon Creek	Pa.
Pittsburgh Coal										
-496	-345	0.0	0.5	0.5	0	1,050	731	0.082	Center Branch Pigeon Cr.	Pa.
Pittsburgh Coal										
-39	-47	0.0	0.5	0.5	1	2,500	3,000	0.144	Tenmile Creek	Pa.
Pittsburgh Coal										
-345	-1,724	0.3	1.7	2.0	10	3,500	17,388	0.200	Dunkard Mill Run	W.Va.
-101	-273	1	1	2	5	1,850	4,995	0.325	Buffalo Creek	W.Va.

Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/da
Bethlehem Mines Corporation, Century No. 105 Mine, Pittsburgh Coal									
Near Loading site	M-141	OYJ-	7.2	-176.6	-191	4	16	20	2
Eastern Associated, Joanne Mine, Pittsburgh Coal Coal Corporation									
No. 1 Borehole*	M-142	344	3.7	200	432	70	10	80	17
	M-143	(001)	8.9	-186	-1,116	2	108	110	66
Fleming Fork Shaft	M-144	344 (002)	7.5	-222	-65	-	-	-	
Joanne Plant	M-145		3.3	90	-	-	-	10	
	M-146		7.0	-44	-	-	-	2	
Eastern Associated Coal Corporation, Federal No. 2 Mine, Pittsburgh Coal									
Near Preparation Plant	M-147	341 (001)	8.2	-772	-352	0.2	0.6	0.8	
Eastern Associated Coal Corporation, Federal No. 1 Mine - Pittsburgh Coal									
Mayo Shaft	M-148	340 (004)	6.5	-39	-4	2	1	3	
Eddy Shaft	M-149		7.5	-524	-62	-	-	0.5	
Keystone Shaft	M-150	340 (001)	8.9	-36	-98	0.2	2.8	3.0	
Old Bottom	M-151	340 (006)	8.2	-811	-156	-	-	2	

*This discharge point had been flooded out and treatment is just resuming. Sample 142 is pond overflow settling.

Table 1 (continued)

Acidity	IRON Dissolved	IRON Suspended	IRON Total		Sulfate		Flow	Receiving	
lb/day	mg/l	mg/l	mg/l	lb/day	mg/l	lb/day	mgd	Stream	State
urgh Coal									
-191	4	16	20	22	540	583	0.130	Right Branch Gnatty Cr.	W.Va
432	70	10	80	173	4,300	9,288	0.260	Buffalo Creek	W.Va.
-1,116	2	108	110	660	4,000	24,000	0.720		
-65	-	-	-	-	10	3	0.035	Fleming Fork	W.Va.
-	-	-	10	-	1,400		0.030	When flowing-to Mods	W.Va.
-	-	-	2	-	1,215			Run-dry when sampled	
Pittsburgh Coal									
-352	0.2	0.6	0.8	-	425	194	.055	Miracle Run	W.Va.
Pittsburgh Coal									
-4	2	1	3	0	3,100	298	0.012	Trib. to Robinson Run	W. Va.
-62	-	-	0.5	0	1,500	180	0.015	Robinson Run	W. Va.
-98	0.2	2.8	3.0	8	4,600	12,420	0.324	Paw Paw Creek	W. Va.
-156	-	-	2	0	350	67	0.022	Paw Paw Creek	W. Va.

is just resuming. Sample 142 is pond overflow and 143 is of treated water pumped from borehole before

Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON To mg/l
Gran Town Shaft	M-152	OYJ-340 (007)	7.2	-387	-24	-	-	-
2 West Borehole	M-153	340 (005)	7.5	-480	-58	-	-	0.5
Refuse Pile	M-154	340 (003)	2.8	1,150	373	15	5	20
Eastern Associated Coal Corporation, Delmont Mine - Pittsburgh Coal								
	M-46	342	6.8	-141	-763	7	8	15
Jones & Laughlin Steel Corporation, Vesta No. 4 Mine - Pittsburgh Coal								
Barcik Borehole	M-1	1118(002)	7.3	-161	-1,341	2.5	4.0	6.5
			6.4	-195	-1,624	0.2	6.8	7.0
Richeyville Shaft	M-17	1118(001)	7.4	30	25	0.0	2.4	2.4
Smallwood Drift	M-2		7.4	30	50	0	2.4	2.4
Jones & Laughlin Steel Corporation, Vesta No. 5 Mine - Pittsburgh Coal								
Thompson Facility	M-16	1117)001)	8.0	-21	-17	0.5	0.5	1.0
Supply Yard Drift	M-18	1117(002)	6.2	-89	-37	0.0	0.5	0.5
Refover Facility	M-15	1117(003)	7.5	-367	-766	0.5	1.5	2.0
Jones & Laughlin Steel Corporation, Shannopin Mine - Pittsburgh Coal								
Air Shaft No. 4	M-10	1116(003)	7.2	-277	-229	0.5	0	0.5
Air Shaft No. 3	M-11	1116(001)	6.8	-319	-134	0.4	10.6	11.0
Air Shaft No. 1	M-12	1116(002)	10.9	-122	-407	1.0	0	1.0

Table 1 (continued)

Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/day	Sulfate mg/l	Sulfate lb/day	Flow mgd	Receiving Stream	State
-387	-24	-	-	-	-	900	54	0.007	Paw Paw Creek	W.Va
-480	-58	-	-	0.5	0	1,350	162	0.015	Paw Paw Creek	W.Va
1,150	373	15	5	20	6	3,000	972	0.400	Paw Paw Creek	W.Va
Pittsburgh Coal										
-141	-763	7	8	15	81	1,900	10,283	0.650	Pigeon Creek to Sewickley	Pa.
- Pittsburgh Coal										
-161	-1,341	2.5	4.0	6.5	54	1,080	8,994	1.00	Pike Run	Pa.
-195	-1,624	0.2	6.8	7.0	58	1,170	9,758			
30	25	0.0	2.4	2.4	2	700	580	0.100	Pike Run	Pa.
30	50	0	2.4	2.4	2	700	580	0.100	Pike Run	Pa
- Pittsburgh Coal										
-21	-17	0.5	0.5	1.0	1	2,550	2,111	0.100	Plum Run	Pa.
-89	-37	0.0	0.5	0.5	0	460	193	0.050	No. Branch Fishpot Run	Pa.
-367	-766	0.5	1.5	2.0	4	2,560	5,345	0.250	Trib. to Little Daniels Run	Pa.
Pittsburgh Coal										
-277	-229	0.5	0	0.5	0	90	75	0.100	Meadow Run	Pa.
-319	-134	0.4	10.6	11.0	5	4,800	2,016	0.050	Dunkard Creek	Pa.
-122	-407	1.0	0	1.0	3	2,850	9,508	0.400	Dunkard Creek	Pa.

Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/day
Jones and Laughlin Steel Corporation, Gateway Mine - Pittsburgh Coal									
Clyde No. 2	M-13	OYJ-	6.9	-98	-182	0.5	0.5	1.0	2
Grimes Portal Pond	M-14		7.0	-293	-243	0.0	0.5	0.5	0
Edwards Shaft	M-19		6.4	-195	-486	-	-	0.5	1
U. S. Steel Corporation, Maple Creek Mine - Pittsburgh Coal									
Ginger Hill Facility	M-9	710 (006-007)	7.8	-726	-9,078	0.0	1.4	1.4	18
U. S. Steel Corporation, Robena Slope - Pittsburgh Coal									
Whiteley Borehole	M-37	(001)	6.4	-29	-326	0.8	0.2	1.0	11 2,
Refuse Pile	M-38		4.2	920	165	102	26	128	23 4,
U. S. Steel Corporation, Robena No. 2 Mine - Pittsburgh Coal									
Bowlby Borehole	M-42	(002)	7.2	-229	-229	0.2	0.4	0.6	1
U. S. Steel Corporation, Robena No. 3 Mine - Pittsburgh Coal									
Garards Fort Borehole	M-39	(003)	6.5	-60	-35	2.0	2.6	4.6	3 2,
Frosty Run Borehole	M-40	(004)	6.6	-347	-694	0.6	1.2	1.8	4 1,
U. S. Steel Corporation, Robena No. 4 Mine - Pittsburgh Coal									
Blaker Borehole	M-41	(005)	6.6	-828	-828	0.4	1.4	1.8	2 1,
Republic Steel Corporation, Clyde No. 3 Mine - Pittsburgh Coal									
Near Main Portal	M-27		7.2	-301	-216	0.0	1.0	1.0	1 1,
Republic Steel Corporation, Banning Mine - Pittsburgh Coal									
Euclid Facility	M-44		7.4	-116	-4,828	0.5	0.5	1.0	21 3

Table 1 (continued)

B

ity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/day	Sulfate mg/l	Sulfate lb/day	Flow mgd	Receiving Stream	State
gh Coal									
-182	0.5	0.5	1.0	2	210	391	0.222	Tenmile Creek	Pa.
-243	0.0	0.5	0.5	0	750	621	0.100	Ruff Creek	Pa.
-486	-	-	0.5	1	630	1,572	0.300	So. Fork Tenmile Creek	Pa.
9,078	0.0	1.4	1.4	18	280	3,501	1.50	Saw Mill Run	Pa.
-326	0.8	0.2	1.0	11	2,650	29,828	1.35	Whiteley Creek	Pa.
165	102	26	128	23	4,500	810	0.02	Trib. to Monongahela R.	Pa.
-229	0.2	0.4	0.6	1	825	825	0.120	So. Branch Muddy Creek	Pa.
-35	2.0	2.6	4.6	3	2,025	1,157	0.069	Whiteley Creek	Pa.
-694	0.6	1.2	1.8	4	1,650	3,299	0.240	Frosty Run	Pa.
-828	0.4	1.4	1.8	2	1,400	1,400	0.120	Frosty Run	Pa.
-216	0.0	1.0	1.0	1	1,950	1,404	0.086	Castile Run	Pa.
,828	0.5	0.5	1.0	21	3,450	143,658	5.00	Youghiogheny River	Pa.

Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/
Fitz Henry Facility	M-45		11.3	-97	-3,234	0.5	0	0.5	17
Near Main Portal	M-47		7.3	-36	-1,200	0.5	1.0	0.5	50
Youhgstown Sheet & Tube, The Buckeye Coal Company, Nemacolin Mine - Pittsburgh Coal									
State Permit 467M074)	M-28		6.9	-48	-115	4.0	8.0	12.0	29
No. 4 Shaft Facility	M-29		8.1	-92	-1,711	0.4	0.6	1.0	18
State Permit 466M065	M-30		7.0	-1,035	-6,210	0.2	1.8	2.0	12
No. 2 Fan (temporary)	M-31		6.0	150	43	20.8	3.2	24.0	17
Duquesne Light Company, Warwick No. 3 and 4 Mine - Pittsburgh and Sewickley Coal									
B-Flat Borehole	M-32	OYJ-339	6.9	-385	-2,509	0.2	11.8	12.0	782
Duquesne Light Company, Warwick No. 2 Mine - Pittsburgh Coal									
Blackshere Portal	M-33	339	6.3	1	12	0.2	0.4	0.6	7
National Mines Corporation, Isabella No 1 and 2 Mine - Pittsburgh Coal									
Near Prep. Plant	M-34	1082	7.1	-309	-12,875	0.1	4.9	5.0	208
Crucible No. 1 Shaft	M-35		7.4	-449	-449	0.2	0.2	0.4	0
5-East Borehole	M-36		6.7	-468	-281	0.0	0.0	0.0	0.0

Table 1 (continued)

Net Acidity		IRON Dissolved	Suspended	Total		Sulfate		Flow	Receiving Stream	State
mg/l	lb/day	mg/l	mg/l	mg/l	lb/day	mg/l	lb/day	mgd		
7	-3,234	0.5	0	0.5	17	3,600	120,009	4.00	Youghiogheny River	Pa.
6	-1,200	0.5	1.0	0.5	50	2,050	68,338	4.00	Youghiogheny River	Pa
acolin Mine - Pittsburgh Coal										
8	-115	4.0	8.0	12.0	29	2,700	6,480	0.288	Monongahela River	Pa.
2	-1,711	0.4	0.6	1.0	18	1,470	27,342	0.223	Muddy Run	Pa.
035	-6,210	0.2	1.8	2.0	12	975	5,850	0.720	Monongahela River	Pa.
150	43	20.8	3.2	24.0	17	2,850	2,052	0.086	Trib. to Little Whiteley Creek	Pa.
ittsburgh and Sewickley Coal										
385	-2,509	0.2	11.8	12.0	782	720	46,915	0.782	Dunkard Creek	Pa.
h Coal										
1	12	0.2	0.4	0.6	7	3,000	36,000	1.44	Whiteley Creek	Pa.
- Pittsburgh Coal										
309	-12,875	0.1	4.9	5.0	208	1,700	70,829	5.00	Monongahela River	Pa.
449	-449	0.2	0.2	0.4	0	1,200	1,200	0.120	Monongahela River	Pa.
468	-281	0.0	0.0	0.0	0.0	200	120	0.072	Trib. to Muddy Creek	Pa.

Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l	IRON Total lb/day	m
Bell Coal Company, Crescent No. 2 or Eclipse - Pittsburgh Coal										
Gravity discharges from portal to mine worked by two men and a mule.	M-3		6.8	-299	-90	0.0	0.0	0.0	0	
	M-4		6.9	-321	-19	0.0	0.0	0.0	0	
	M-5		6.5	-243	-9	0.5	2.5	3.0	0	
Paul Krevokuck, Scott Haven Mine - Redstone Coal										
At Portal	M-43		6.5	-300	-7	1.0	0.0	1.0	0	
Bull Run Mining Company, Bull Run Mine - Upper Freeport Coal										
	M-128		3.0	850	306	-	-	200	72	
J & H Coal Company, J & H Mine - Upper Freeport Coal										
	M-129		2.9	680	8	-	-	190	2	
Clinchfield Coal Company of Pittston Company, Mars #2* - Pittsburgh Coal										
Katy Lick Treat. Plant	M-130		10.5	-435	-653	0	0	0	0	
Short Farm Shaft	M-131	243	7.6	-325	-4	0	1	1	0	
Clinchfield Coal Company of Pittston Company, Compass No. 2* Mine - Pittsburgh Coal										
Gawthrar Shaft	M-132	242	6.9	-20	-20	1	1	2	2	
Rockcamp Run Treatment Plant	M-133		6.9	-51	-140	1	3	4	11	

*Reported closed August 25, 1972

B

Table 1 (continued)

Acidity	IRON Dissolved		Suspended		Total		Sulfate		Flow	Receiving	
lb/day	mg/l		mg/l		mg/l	lb/day	mg/l	lb/day	mgd	Stream	State
Coal											
-90	0.0		0.0		0.0	0	800	240	0.036	Monongahela River	Pa.
-19	0.0		0.0		0.0	0	600	36	0.007	Monongahela River	Pa.
-9	0.5		2.5		3.0	0	920	33	0.003	Monongahela River	Pa.
-7	1.0		0.0		1.0	0	360	9	0.003	Trib. to Youghiogheny R.	Pa.
al											
306	-		-		200	72	980	352	0 043	Bull Run	W Va
8	-		-		190	2	600	7	0.001	Trib. to Bull Run	WV
ittsburgh Coal											
-653	0		0		0	0	240	360	0.180	Katy Lick Run	WV
-4	0		1		1	0	40	0	0.001	Ten Mile Creek	WV
2* Mine - Pittsburgh Coal											
-20	1		1		2	2	5,300	5,279	0.120	Rockcamp Run	WV
-140	1		3		4	11	2,600	7,145	0.329	Little Rockcamp Run	WV

Table 1 (continued)

Discharge Name	Sample Number	Refuse Act Permit Number	pH	Net Acidity mg/l	Net Acidity lb/day	IRON Dissolved mg/l	IRON Suspended mg/l	IRON Total mg/l
Main Pit Mouth	M-135	OYJ-	6.8	-188	-338	60	10	70
Clinchfield Coal Company of Pittston Company, Compass No. 3* - Pittsburgh Coal								
Jones Creek Portal	M-134		6.3	211	17	90	20	110
Laurel Run Borehole	M-136		7.8	-265	-1,272	0	1	1
Clinchfield Coal Company of Pittston Company, Badger #14 and 15 Mines - Middle & Upper Kittanning Co								
NO. 14 & 15 Treatment Plant	M-137	268	8.2	-3	-5	0	0	0
Reliable Coal Corporation, Kanes Creek Mine - Upper Freeport Coal								
South Portal	M-155		2.9	153	18	8.0	0	8.0
North Portal	M-156		9.1	-48	-6	0.5	0.5	1
Alco Standard Corporation/Upshur Coal Corporation, Adrian Mine - Upper Freeport Coal								
Borehole No. 4	M-157		6.6	-186	-558	6	4	10
Borehole No. 1	M-158		6.6	-285	-1,710	2	1	3
Borehole No. 8	M-159		7.3	-114	-171	0.5	0	0.5
Borehole No. 3**	M-160		5.4	-9	-	-	-	-

*Reported closed August 25, 1972 **Usually has no discharge, being pumped to supply water f

Table 1 (continued)

et Acidity		IRON Dissolved	Suspended	Total		Sulfate		Flow	Receiving	State
/l	lb/day	mg/l	mg/l	mg/l	lb/day	mg/l	lb/day	mgd	Stream	
38	-338	60	10	70	126	1,025	1,845	0.216	Little Ten Mile Creek	WV
o. 3* - Pittsburgh Coal										
11	17	90	20	110	9	740	62	0.010	Jones Creek	WV
65	-1,272	0	1	1	5	4,300	20,640	0.575	Laurel Run	WV
4 and 15 Mines - Middle & Upper Kittanning Coal										
-3	-5	0	0	0	0	600	994	0.200	Tygart Valley River	WV
eport Coal										
53	18	8.0	0	8.0	1	620	74	0.014	Kanes Creek	WV
48	-6	0.5	0.5	1	0	940	11	0.014	Dillon Creek	WV
an Mine - Upper Freeport Coal										
86	-558	6	4	10	30	460	1,380	0.360	Blacklick Creek	WV
85	-1,710	2	1	3	18	300	1,800	0.720	Blacklick Creek	WV
14	-171	0.5	0	0.5	1	340	510	0.180	Trib. to Bull Run	WV
-9	-	-	-	-	-	210	-	-	Blacklick Creek	WV

no discharge, being pumped to supply water for construction on surface.

TABLE 2

Active Underground Mines with no Reported Discharges

Mine Name or Owner	Location
A. Lipp	Monongahela, Pennsylvania
Helen Mine	Masontown, Pennsylvania
Petite Brothers	Point Marion, Pennsylvania
King Mine	Smithton, Pennsylvania
J. Petille	Maidsville, West Virginia
Coal Resources	Osgood, West Virginia
Indian Creek Coal	Fort Grand, West Virginia
National Coals Incorporated (Christopher No. 5)	National, West Virginia
Stentz Mine	Brownton, West Virginia
Miller Mine	Buckhannon, West Virginia
Peck Run Coal	Hodgesville, West Virginia
Herring Coal No. 2 Mine	Masontown, West Virginia
State of West Virginia Prison Mine (Huttonsville)	Cassity, West Virginia
Thorne Coal	Tunnelton, West Virginia

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Pennsylvania Mines

The streams near the active deep mines in the Pennsylvania portion of the Monongahela River basin generally were not visibly polluted by the active mines. The mine drainage treatment facilities were generally well maintained and well operated. The more positive attitude toward eliminating water pollution is the result of years of effort from industry, the Commonwealth of Pennsylvania and from citizens. Each has worked for fair laws establishing water quality criteria for mine discharges. The Pennsylvania Department of Environmental Resources requires active mine discharges to meet effluent guidelines imposed by the Commonwealth. In general, these requirements limit the pH to between 6.0 and 9.0 units, require a total iron concentration of 7 mg/l or less, and require a final effluent exhibiting net alkalinity.

Although these are the effluent criteria imposed by the Commonwealth on active underground mine discharges under the 1965 amended Clean Streams Law, the water quality standards of the receiving stream are also of prime importance in determining the compliance status of a particular mine drainage discharge. A 1.5 mg/l total iron concentration has been adopted by the Commonwealth for streams in the Pennsylvania portion of the Monongahela River basin.

A permit is required from the DER for each point of mine drainage discharge from an active mine. The effluent requirements for each discharge are specified in the permit. As conditions require, the discharge may exceed the guidelines listed above or conversely it may require more restrictive limitations. The DER may also require limitations on other mine drainage constituents such as aluminum, manganese, sulfates, etc., as deemed necessary.

A total of 27 active underground mines were visited in the Pennsylvania portion of the Monongahela River basin. Four active mines produced no discharge. Forty-five mine drainage discharges were collected at the active draining mine sites. The methods of handling these discharges by the respective mines may be summarized as follows:

Chemical treatment:	13
Holding ponds with or without aeration:	9
Non-chemical treatment:	1
No treatment:	22

Chemical treatment generally consisted of lime neutralization, aeration (optional), and settlement. The Delmont Mine of Eastern Associated Coal Corporation supplied underground lime neutralization followed by the addition of soda ash (sodium carbonate) from a surface facility. The mine drainage discharge from the Marianna Mine of Bethlehem Mines Corporation is combined with the water required for operation of the coal preparation plant. The final effluent from the plant is clarified and pumped to a series of holding ponds for future use or for eventual discharge. A lime neutralization

facility is available for conventional mine drainage treatment during any extended period when the preparation plant is not in operation.

There was no treatment of any type supplied for 22 of the active discharges. In most cases, the water discharged was of acceptable quality and no treatment was required. The Hutchison Mine of Pittsburgh Consolidated Coal was the only mine which did not supply treatment for a discharge of poor quality. The Pennsylvania DER and the Hutchison Mine operators are presently in litigation concerning this matter. Table 3 presents a summary of the active underground mines and the method for handling the mine drainage discharge at each site. Analyses for the individual discharges are shown in Table 1 beginning on page 19.

Hutchison Mine

The main discharge from the Hutchison Mine (adjacent to the preparation plant) contributed a major pollutant load to Little Sewickley Creek. The acid and iron concentrations of this discharge were 390 mg/l and 230 mg/l, respectively. The other discharge from this mine is the Herminie Deep Well near the community of Herminie on Little Sewickley Creek. The discharge from this borehole was alkaline (37 mg/l); however, it exhibited a total iron concentration of 95 mg/l. The individual flow rates for the discharges were not reported by the Company. However, they did report that the combined flow was approximately 8 million gallons per day. Irrespective of

Table 3

Active Underground Mine Discharges, Pennsylvania

Mine Name	Name of Discharge Site	Method of Treatment
Bell Coal Company	Crescent No. 2	None
Bell Coal Company	Crescent No. 2	None
Bell Coal Company	Crescent No. 2	None
Bethlehem Ellsworth No. 51	Combined Midway	Neutralization, Settlement
Bethlehem Mine No. 60	467M055 [1]	Holding ponds only
Bethlehem Marianna Mine	-	See text, page 34
U. S. Steel Maple Creek	Ginger Hill	Holding ponds only
J & L Shannopin Mine	Air Shaft #4	None
J & L Shannopin Mine	Air Shaft #3	None
J & L Shannopin Mine	Air Shaft #1	Neutralization, settlement
J & L Gateway Mine	Clyde #2 @ Pit Gas	None
J & L Gateway Mine	Grimes Portal	Holding pond only
J & L Gateway Mine	Edwards Shaft	None
J & L Vesta No. 4 Mine [2]	Smallwood Drift	None
J & L Vesta No. 4 Mine	Bercik Treatment Plant [3]	Aeration, settlement
J & L Vesta No. 4 Mine	Richeyville Water Tank	None
J & L Vesta No. 5 Mine	Kefover Treatment Plant	Neutralization, settlement
J & L Vesta No. 5 Mine	Supply Yard Drift	None
J & L Vesta No. 5 Mine	Thompson Treatment Plant	Neutralization, settlement
Consolidation Coal Mathies Mine	No. 2 Pit Mouth	None
Consolidation Coal Mathies Mine	Mingo Treatment Plant	Neutralization, settlement aeration

Table 3 (continued)

Mine Name	Name of Discharge Site	Method of Treatment
Consolidation Coal Mathies Mine	Thomas Shaft	Aeration, settlement
Republic Steel Clyde No. 3 Mine	-	Holding pond only
Buckeye Coal Nemacolin Mine	467M074 1/	Holding ponds
Buckeye Coal Nemacolin Mine	No. 4 Shaft 4/	Neutralization, settlement
Buckeye Coal Nemacolin Mine	466M065 1/	None
Buckeye Coal Nemacolin Mine	No. 2 Fan	Neutralization, aeration, settlement
Duquesne Light Warwick No.3 and 4	B-Flat Borehole	None
Duquesne Light Warwick No.2	5 North Borehole or Blackshere Portal	Neutralization, settlement
National Mines Isabella No. 1 and 2	466M075 1/	Aeration, settlement
National Mines Isabella Mine	Crucible #1 Shaft	None
National Mines Isabella Mine	5 East Borehole	None
U.S. Steel Robena Mine	Robena Slope (Whitely Borehole)	Neutralization, aeration, settlement
U.S. Steel Robena Mine	Refuse Pile	None
U.S. Steel Robena #2 Mine	Bowlby Maintenance Shaft	Holding ponds
U.S. Steel Robena #3 Mine	Garards Fort Borehole	None
U.S. Steel Robena #3 Mine	Frosty Run Borehole	None
U.S. Steel Robena #4 Mine	Blaker Shaft	None

Table 3 (continued)

Mine Name	Name of Discharge Site	Method of Treatment
Scott Haven Mine	467M015 1/	None
Republic Steel Banning Mine	Euclid Treatment Plant	Neutralization, aeration, settlement
Republic Steel Banning Mine	Fitz Henry Treatment Plant	Neutralization, aeration, settlement
Republic Steel Banning Mine	Banning #4 (466M041 1/)	Neutralization, aeration, settlement
Eastern Associated Coal Delmont Mine	-	Neutralization, settlement
Pittsburgh Consolidated Coal Hutchison Mine	Herminie Deep Well	None
Pittsburgh Consolidated Coal Hutchison Mine	Little Sewickley Creek	None

1/ Pennsylvania mine drainage permit number.

2/ Drift inactive, but part of active Vesta Mine.

3/ Lime neutralization and aerator installed since date of this survey.

4/ Upgraded treatment facilities installed since date of survey.

the individual flow rates, the discharges from the Hutchison Mine contributed significant acid and iron loads to Little Sewickley Creek.

Acid Discharges

Among the Pennsylvania mines, there were only a few additional sources which contributed an acid discharge to streams in the Commonwealth. An acid discharge from the Nemacolin Mine, operated by the Buckeye Coal Company, resulted from a dewatering operation of an underground section which had been flooded in order to extinguish a mine fire. Treatment was supplied by means of a temporary lime neutralization facility at the site. However, the treatment was inadequate to produce an alkaline discharge. It was reported by the Company that this pumping operation was only temporary and would cease once the flooded section was dewatered.

The large refuse pile at the Robena Mine preparation plant adjacent to the road leading to the small community of Alicia, contributed an acid load of 165 lb/day to the Monongahela River. It also appeared that there were additional sources (cumulative seepage) about the perimeter of the refuse dump.

A net acid load of 25 lb/day was contributed by the Richeyville Shaft of the Vesta No. 4 Mine at Richeyville, Pennsylvania.

Iron Discharges

Two of the 13 mine drainage treatment facilities supplying chemical treatment contributed a final effluent which carried an

iron concentration exceeding 7 mg/l. These were the Nemacolin No. 2 Fan and the Delmont Pigeon Creek facilities. The Nemacolin No. 2 Fan is the temporary dewatering facility mentioned above. The iron concentrations in the final effluents of the Nemacolin and Delmont Mines were 24 mg/l and 15 mg/l, respectively.

The remaining chemical treatment facilities had no problems in limiting the total iron concentration to 7 mg/l or less. In fact, none of these facilities contributed a total iron concentration exceeding 3 mg/l. This represents a substantial reduction from the 7 mg/l limit recommended by the Monongahela Enforcement Conference. The dissolved iron portion of the total iron contribution never exceeded one mg/l at the above sites. These low level total iron concentrations were apparently obtained during normal operation of the facilities without the specific objective of producing these results. Since only a single sample was collected at each site, obviously it cannot be implied that such results reflect established effluent water quality criteria for such treatment plants. However, it does reflect the efficiency with which such plants can upgrade the quality of their mine drainage effluent. It is of particular note that 11 of the 13 plants were operating at this high degree of efficiency when sampled on a random basis.

There were nine Pennsylvania facilities which provided holding ponds for their mine discharges. In addition, aeration was also supplied at several sites. Only one of these facilities produced an effluent which carried a total iron concentration exceeding 7 mg/l.

This was the Nemacolin Mine facility located on the Monongahela River near their coal preparation plant. The effluent is pumped to a series of holding ponds prior to discharge. The total iron concentration was 12 mg/l.

At the time of survey, only sedimentation and aeration were supplied at the Bercik treatment facility operated by Jones & Laughlin Steel Corporation at their Vesta No. 4 Mine. Since the date of inventory, however, lime neutralization and additional aeration facilities have been installed to upgrade the quality of treatment at this site.

There were 22 active discharge sites which provided no treatment of any type. Six of these sites produced an effluent which exhibited a total iron concentration exceeding 7 mg/l. Five of these were actual mine drainage discharges and the sixth represented cumulative seepage from a mine refuse disposal area. Those discharges which exceeded a total iron concentration of 7 mg/l by only a moderate amount were the Shannopin No. 3 Air Shaft, Mathies Mine No. 2 Pit Mouth, and the Warwick B Flat Borehole. The total iron concentrations were 11 mg/l, 8.6 mg/l and 12 mg/l, respectively. The refuse pile seepage from the Robena Mine exhibited an iron concentration of 128 mg/l. The remaining two sources were those from the Hutchison Mine, discussed in an earlier section.

After evaluating the volume of discharge from the above mentioned Pennsylvania sources and the volume of the receiving streams,

it seems unlikely that any of the effluents which moderately exceeded a total iron concentration of 7 mg/l or exhibited a moderate net acidity actually resulted in any major water quality impairment in the receiving streams. The Hutchison discharges may be the only examples of an active mine discharge seriously affecting the water quality of the receiving stream.

Excluding the acid discharge from the Hutchison Mine, the mines listed in Table 3 discharged a net alkaline load of nearly 29 tons per day to streams in the Pennsylvania portion of the Monongahela River basin.

West Virginia Mines

The Division of Water Resources, Department of Natural Resources, has the responsibility and authority to control mine drainage discharges from active mines in West Virginia. At the present time, control over active discharges is regulated by conditions set forth in the permit which is required for each discharge point. There are no effluent standards for active mine drainage discharges. These discharges are required to meet the water quality standards of the receiving stream. For streams in the West Virginia portion of the Monongahela River basin, a pH value between 6.0 and 8.5 is required. Streams previously affected by mine drainage are required to maintain a pH value above 5.5. The sulfate concentration is not to exceed 200 mg/l in the stream. There are no stream standards for other mine drainage parameters such as iron, manganese and aluminum.

The following information on active mine discharges in the West Virginia portion of the Monongahela River basin was obtained during the general inventory of all mine operations in the basin. A total of 35 active underground mines were visited in the West Virginia portion of the Monongahela River basin. Ten of these operations produced no discharge according to their owners or operators. Four of the mines discharging water were under the Christopher Division and six were under the Mountaineer Division of Consol. These mines, as well as the Federal No. 1 and the

Joanne Mine of Eastern Associated Coal Corporation, are discussed later in this report.

The 25 active mines in West Virginia contributed a total of 112 discharges. This includes four of the seven discharges from Consol's Humphrey No. 7 Mine, which are actually in Pennsylvania. At the time of the general inventory, the 10 mines in the Christopher and Mountaineer Divisions of Consolidation Coal Company contributed 75 of the total 112 discharges. The remaining 37 mine drainage discharges came from 15 other mines in the West Virginia portion of the Monongahela River basin. The methods of handling these discharges by the respective mines may be summarized as follows:

Chemical treatment:	8
Holding lagoons with or without aeration:	8
No treatment:	21

Table 4 presents a summary of the active underground mines and the method of handling the mine drainage discharge at each site. Analyses for the individual discharges are presented in Table 1. A brief description of each mine is given below.

The Bethlehem Mines Corporation owned and operated the Bethlehem No. 41C Mine on Buffalo Creek at Barracksville, West Virginia. The highly alkaline quality of the water from this mine appeared to be a phenomenon resulting from a natural alkalinity present in the coal and even the coal refuse. This was

Table 4

Active Underground Mine Discharges, West Virginia

Mine Name	Name of Discharge Site	Method of Treatment
Bethlehem No. 41	Dunkard Mill	Aeration, settlement
Bethlehem No. 41	Falls Run (refuse pile)	None
Bethlehem Century No. 105	-	Holding pond
Eastern Associated Coal Joanne Mine	No. 1 borehole [1]	Neutralization, settlement
Joanne Mine	Fleming Fork Shaft	None
Joanne Mine	Preparation Plant	Settlement
Eastern Associated Coal Federal No. 2	-	None
Eastern Associated Coal Federal No. 1	Mayo Shaft	Settlement
Federal No. 1	Eddy Shaft [2]	Holding tank
Federal No. 1	Keystone Treatment Plant	Neutralization, aeration, settlement
Federal No. 1	Old Bottom	None
Federal No. 1	Grant Town Shaft	None
Federal No. 1	2 West Borehole	None
Federal No. 1	Refuse Pile	None
Bull Run Mining Company	-	Settlement
J & H Coal Company	-	None
Clinchfield Coal Mars No. 2 [3]	Katy Lick Treatment Plant	Neutralization, settlement
Mars No. 2	Short Farm	None
Clinchfield Coal Compass No. 2 [3]	Gawthar Air Shaft	None
Compass No. 2	Rockcamp Treatment Plant	Neutralization, settlement
Compass No. 2	Drift Mouth No. 2	None

Table 4 (continued)

Mine Name	Name of Discharge Site	Method of Treatment
Clinchfield Coal Compass No. 3 3/	Jones Creek Portal	None
Compass No. 3	Laurel Run Treatment Plant	Neutralization, settlement
Clinchfield Coal Badger No. 14 and 15	Treatment Plant	Neutralization, settlement
Reliable Coal Kanes Creek Mine	South Portal	Neutralization, settlement
Kanes Creek Mine	North Portal	Neutralization, settlement
Alco Standard Corp. Upshur Coal	Borehole No. 4	None
Upshur Coal	Borehole No. 1	None
Upshur Coal	Borehole No. 8	None
Upshur Coal	Borehole No. 3	None 2/
Blacksville No. 1	Production Shaft	None
Blacksville No. 1	Service Shaft	None
Blacksville No. 1	Kings Run Air Shaft	None
Blacksville No. 2	Carpenter Shaft 4/	None
Blacksville No. 2	Brenner Air Shaft 4/	Settlement
Blacksville No. 2	Production Shaft	Settlement
Blacksville No. 2	Service Shaft	None

1/ Upgraded treatment facility under construction.

2/ Water stored for mine use, only excess discharged

3/ Mine reportedly closed August 1972

4/ Shaft location in Pennsylvania

noted only at this mine and at the now abandoned adjacent Idamay Mine, also operated by Bethlehem Mines. No treatment other than aeration and sedimentation was required at the Dunkard Mill borehole to produce an effluent with a pH of 7.6, net alkalinity of 345 mg/l, and 2 mg/l of total iron. The flow of 138 gpm did not visibly affect the receiving stream. The Falls Run discharge was untreated water from the area of the refuse pile and coal slurry settling pond. The water quality was similar to the Dunkard Mill discharge, and the 225 gpm flow did not visibly affect the receiving stream, Buffalo Creek.

The Century 105 Mine was a newly opened mine at the time of the visit. The discharge of 90 gpm flowed to the Right Branch of Gnatty Creek after passing through a small settling pond. The pH of the discharge was 7.2 and net alkalinity was 177 mg/l. The iron content was 20 mg/l as a result of inadequate settling time in the pond. The treatment system was soon to be improved.

The Eastern Associated Coal Corporation mines were the Joanne Mine, the Federal No. 1 Mine and the Federal No. 2 Mine. The Joanne Mine and the Federal No. 1 Mine are discussed in detail later in this report since those mines were revisited. The Federal No. 2 Mine discharge to Miracle Run required no treatment, having a pH of 8.2, net alkalinity of 772 mg/l and 0.8 mg/l of total iron. The flow was 38 gpm.

The Bull Run Mining Company and the J and H Coal Company were

small owner-operated mines near Masontown, West Virginia. The mines discharged to Bull Run, a tributary to the Cheat River. The discharge from the J & H operation was highly acidic (acidity = 680 mg/l, pH=2.9) although the flow was small, approximately one gallon per minute. The 30 gpm discharge from the Bull Run Mine was a combination of drainage from an active portal as well as drainage from an abandoned opening immediately adjacent to the active opening. The acid and iron loads from this site were 306 lb/day and 72 lb/day, respectively.

Some drainage problems were found at the Compass No. 2 and Compass No. 3 Mines of the Clinchfield Coal Corporation. These mines were reportedly closed in August 1972 and, therefore, the present status of the mine drainage discharges from these operations is not known.

Clinchfield Coal Corporation operated the Badger No. 13, 14 and 15 Mines near Philippi, West Virginia. A treatment facility was constructed at the No. 14 and 15 Mines which treated drainage from both operations. The final effluent from this facility exhibited a net alkalinity with a zero iron concentration. The Badger No. 13 Mine was an older operation purchased by Clinchfield from a previous operator. The quality and quantity of any discharge produced by this mine is not known.

The Kanes Creek Mine, operated by the Reliable Coal Corporation, was located south of Masontown, West Virginia. Both portals of the mine were located on tributaries to Deckers Creek.

The North Portal treatment facility produced a final effluent exhibiting a net alkalinity and a zero iron concentration. Although a treatment facility was in operation at the South Portal, the final effluent had a pH of 2.9 with an acidity concentration of 153 mg/l. The lack of sufficient lime addition appeared to be the reason for the inadequate operation of this facility at the time of visit.

Four borehole discharges were sampled at the Adrian Mine operated by the Alco Standard Corporation, south of Buckhannon, West Virginia. Borehole No. 3 was the only source which exhibited a pH value below 6.5; however, it carried a net alkalinity as did the other three borehole effluents. A new bath house was under construction at the time of visit and the water from the No. 3 borehole was being used in construction and was the future source of water for the new facility.

REINVESTIGATION OF CONSOLIDATION COAL COMPANY

(MOUNTAINEER AND CHRISTOPHER DIVISIONS)

The data collected during the general inventory was evaluated. It was readily apparent that a considerable portion of the active acid mine drainage problem in the West Virginia portion of the basin came from the Christopher and Mountaineer Divisions of Consolidation Coal Company. The Blacksville Division did not contribute any acid problems to basin receiving streams.

A cooperative resampling program was initiated with Consolidation Coal Company. A field crew from the Wheeling Field Office and a representative from Consolidation Coal resampled all the mine drainage discharges located during the general inventory. Stream sampling was also conducted coincident with the effluent sampling. At the conclusion of this resampling round, an additional round was also completed at selected sites. At this time, the sampling was conducted without representation of Consolidation Coal but with their permission to continue the sampling program. During the intervening time period between the general inventory and the resampling period, March 1972 to August 1972, significant changes were made by Consol at several of their discharge sites. This included rerouting of discharges and the installation of new mine drainage treatment facilities.

The following sections of this report will discuss separately each of the ten mines in the two divisions of the Consolidation Coal Company. A sketch of discharge locations and a separate

table presenting the mine drainage data is included for each mine. The tables include the data collected during the general inventory as well as the additional one or two samples collected during the reinvestigation. Although Table 1, as presented earlier, also lists the data collected during the general inventory, it is reiterated at this point for comparison purposes.

During the general inventory, flow rates at the discharge points were supplied by personnel associated with the Mountaineer and Christopher Divisions. During the second and third sampling rounds, flow rates were either measured in the field or extracted from the Refuse Act Permit application as submitted by Consolidation Coal Company for the particular discharge in question. Since many of the mine water pumps are not continuously operated, the flow rates, as measured in the field and extrapolated to a daily flow rate, may exceed the flow rates as listed in the permit applications.

Humphrey No. 7 Mine

The Humphrey No. 7 Mine was an interstate operation located in Greene County, Pennsylvania and Monongalia County, West Virginia. The discharge locations are indicated on the sketch on page 56, and the water quality data is listed in the table on pages 57 and 58.

The main portal was located at Mt. Morris, Pennsylvania with a second portal at the Bowers Shaft, also in Pennsylvania. There were three discharges from the mine which entered the Pennsylvania portion of Dunkard Creek, an interstate stream. These were the Bowers Shaft, Calvin Run Shaft, and the Mt. Morris Shaft. On each sampling occasion, the pH values from these sites remained above 7.5 and exhibited net alkalinity. At each sampling point, the total iron concentration was 1 mg/l or less.

The Eddy Borehole was also situated on Dunkard Creek, but was located on the West Virginia portion of the stream. The pH values at this discharge point remained above 7.5 and the flow exhibited net alkalinity. Although the total iron concentration ranged from 0.5 mg/l to 6 mg/l, there was no visible effect upon the water quality of Dunkard Creek.

The remaining six discharges from the Humphrey No. 7 Mine were located on Robinson Run in West Virginia. In downstream order, these were the No. 1 Shaft, Bowlby #1 and #2 pumps, 114+00 borehole, 4100 borehole and the Maidsville Portal.

Upstream from the No. 1 Shaft, Robinson Run was unaffected by coal mine drainage. The discharge from the No. 1 Shaft was only marginally acid and did not visibly affect the water quality of

the receiving stream in the headwaters area. The Bowlby No. 1 and No. 2 Pumps were major contributors of acid mine drainage to Robinson Run. During the first sampling (3-72) both pumps were in operation and contributed a combined acid load of more than 30 tons per day. During the next two sampling periods, only the Bowlby No. 1 Pump was operating. The acid load discharged by the No. 1 Pump during September and October 1972 ranged from more than 3 tons per day to 6 tons per day. The Bowlby Pumps were located on a small unnamed tributary to Robinson Run which was unaffected by mine drainage above the pump locations. During the September sampling, the main stem of Robinson Run carried a net acid load of 4.5 tons per day below the influent from the Bowlby pumps. The iron load at this same point was 1.7 tons per day.

In downstream order, the next Humphrey No. 7 discharge was the 114+00 Borehole on an unnamed tributary to Robinson Run. On two sampling occasions, the acid load ranged from 0.6 to 4.4 tons per day with pH values of 3.2 and 3.5.

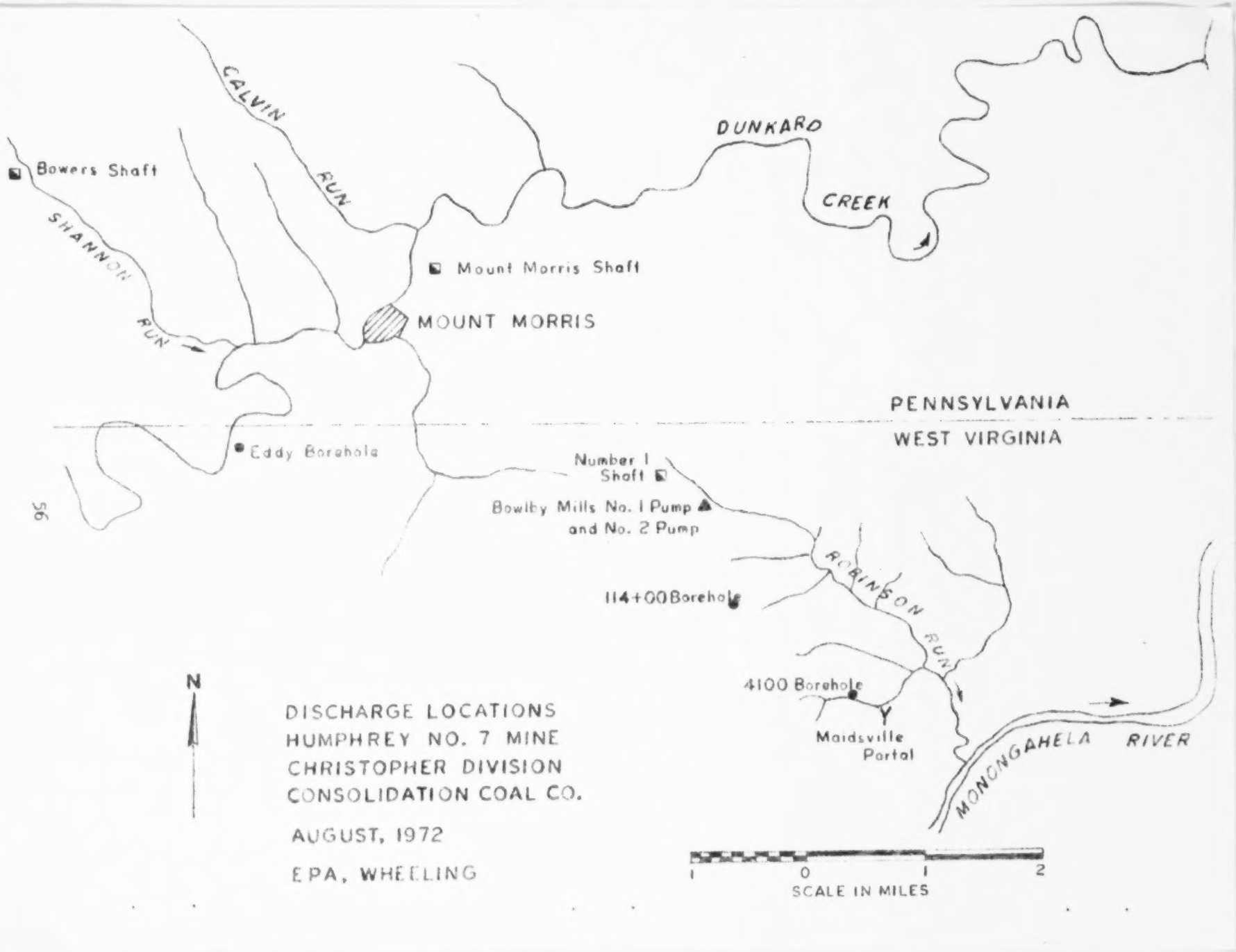
There were two additional discharges from this mine on Robinson Run. They were the 4100 borehole and the Maidsville Portal which were both located on the same unnamed tributary to Robinson Run. The discharge exhibited a pH range of 2.6 to 3.9 and carried an iron concentration ranging from 380 to 500 mg/l. The Maidsville Portal was an abandoned opening from the Maidsville Mine which was

interconnected with active workings of the Humphrey No. 7 Mine. The gravity discharge from the mine carried an acid load ranging from 0.6 to 1.0 ton per day. The average iron load from this discharge exceeded 300 lb/day.

During the Humphrey Mine study, stream samples and corresponding stream flow measurements were taken at the mouth of Robinson Run. The pH value of the first sample was 2.6, and the acid load was 49,600 lb/day. At this same time, the iron load entering the Monongahela River was 14,500 lb/day. At a second sampling of this location, the Robinson Run exhibited a pH value of 3.4 and carried an acidity concentration of 1,400 mg/l.

Coal from the Humphrey No. 7 Mine was processed at the Maidsville preparation plant on the Monongahela River. This plant also processed coal from the Purseglove No. 15 Mine. During the survey period, a discharge of 15 gpm was measured at the base of the refuse pile associated with the Maidsville Plant. The pH of this discharge was 7.4 and the iron load was only 7 lb/day.

There were no mine drainage treatment plants in operation at the Humphrey No. 7 Mine. A system of dilution and settlement was employed at the Mount Morris Shaft for treatment of a small volume discharge. At several additional sites, equalization ponds were installed which had the added benefit of preventing some solid material from entering the receiving stream.


CALVIN RUN
DUNKARD CREEK
Bowers Shaft
SHANNON RUN
Mount Morris Shaft
MOUNT MORRIS
PENNSYLVANIA
WEST VIRGINIA
Eddy Borehole
Number 1 Shaft
Bowlby Mills No. 1 Pump and No. 2 Pump
114+00 Borehole
ROBINSON RUN
4100 Borehole
Maidsville Portal
MONONGAHELA RIVER
N
DISCHARGE LOCATIONS
HUMPHREY NO. 7 MINE
CHRISTOPHER DIVISION
CONSOLIDATION COAL CO.
AUGUST, 1972
EPA, WHEELING
1 0 1 2
SCALE IN MILES

A

Humphrey No. 7 Mine

Sample Location	Refuse Act Permit No. OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron 3/72	Total Iron 9/72
to Robinson Run									
headwaters			7.5			-108 (-4)			0 (0)
Number 1 Shaft	132	7.2	7.3		138 (17)	-160 (-2)		10 (1)	4 (0)
Robinson Run Upstream				7.1			-132 (-146)		
Upstream tributary			7.4	7.5		-185 (-22)	-119 (-20)		0 (0)
Bowlby Mills No. 1 Pump	129	5.2	4.0	4.2	1,690 (16,200)	1,372 (6,590)	1,660 (12,000)	500 (4,800)	600 (2,880)
Bowlby Mills No. 2 Pump	"	5.8			1,235 (44,500)			500 (18,000)	
Robinson Run downstream			3.4			1,235 (9,070)			450 (3,300)
114+00 Borehole	110	3.5	3.2		1,470 (1,180	1,765 (8,850)		100 (80)	600 (3,010)
4100 Borehole	111	3.9	2.6	3.4	3,275 (3,930)	1,950 (-)	1,570 (-)	500 (600)	380 (-)
Maidsville Portal		6.2	2.4	3.5	1,485 (1,780)	3,725 (1,210)	4,380 (1,960)	250 (300)	1,000 (324)
Robinson Run @ Mouth			2.6	3.4		2,050 (49,600)	1,400		600 (14,500)

Humphrey No. 7 Mine

B

10/72	Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72		Flow (mgd) 3/72	9/72	10/72
		-108 (-4)			0 (0)			1,010 (36)				0.004	
	138 (17)	-160 (-2)		10 (1)	4 (0)		1,960 235	1,080 (13)			0.014	0.001	
7.1			-132 (-146)			0.2 (0)							0.132
7.5		-185 (-22)	-119 (-20)		0 (0)	0.2 (0)		150 (180)				0.014	0.020
4.2	1,690 (16,200)	1,372 (6,590)	1,660 (12,000)	500 (4,800)	600 (2,880)		1,890 (18,100)	2,150 (10,300			1.152	0.576	0.864
	1,235 (44,500)			500 (18,000)			1,755 (63,200)				4.32		
		1,235 (9,070)			450 (3,300)			1,715 (12,600)				0.881	
	1,470 (1,180	1,765 (8,850)		100 (80)	600 (3,010)		1,710 (1,380)	2,300 (11,500)			0.096	0.602	
3.4	3,275 (3,930)	1,950 (-)	1,570 (-)	500 (600)	380 (-)		3,825 (4,590)	2,450 (-)			0.144		
3.5	1,485 (1,780)	3,725 (1,210)	4,380 (1,960)	250 (300)	1,000 (324)		1,400 (1,680)	3,200 (1,040)		L.A.	0.144	0.039	0.053
3.4		2,050 (49,600)	1,400		600 (14,500)			2,250) (54,400)				2.902	4.456

Humphrey No. 7 Mine (continued)

Sample Location	Refuse Act Permit No. PAOYU-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron mg/l (lb/day) 9/72	Total Iron mg/l (lb/day) 10/72
to Dunkard Creek									
upstream			7.7			-188 (-10,700)			0 (0)
Eddy Borehole	108	8.3	7.5		-543 (-5,210)	-533 (-3,440)		0.5 (5)	6 (38)
downstream			7.8			-160 (-10,100)		0.5 (32)	
Bowers Shaft (washhouse?)			8.4			-266 (-96)			0 (0)
Bowers Shaft	136	8.3	7.5		-217 (-52)	-195 (0)		0.3 (0)	0.5 (0)
Mount Morris Shaft		7.8	8.2		0 (0)	-40 (-12)		1.0 (0)	0 (0)
upstream			7.4			-185 (-62)		0.5 (0)	
Calvin Run Shaft	137	8.3	8.2		-147 (-53)	-361 (0)		0.5 (0)	0.5 (0)
downstream			7.5			-184 (-62)		1.0 (0)	
to Monongahela River									
Refuse Pile	141			7.4			L.A.		40 (7)

Humphrey No. 7 Mine (continued)

B

Acidity mg/l (lb/day)			Total Iron mg/l (lb/day)			Sulfates mg/l (lb/day)			Flow (mgd)		
3/72	9/72	10/72	3/72	9/72	10/72	3/72	9/72	10/72	3/72	9/72	10/72
-188				0			620				
(-10,700)				(0)			(35,300)			6.830	
-533			0.5	6		2,475	1,600				
(-3,440)			(5)	(38)		(23,800)	(10,300)		1.152	0.775	
-160			0.5				460				
(-10,100)			(32)				(29,200)			7.605	
-266				0			315				
(-96)				(0)			(113)			0.043	
-195			0.3	0.5		500	1 [illegible]				
(0)			(0)	(0)		(120)	(0)		0.029	0	
-40			1.0	0		90	640				
(-12)			(0)	(0)		(13)	(200)		0.018	0.037	
-185			0.5			55					
(-62)			(0)			(19)				0.040	
-361			0.5	0.5		550	450				
(0)			(0)	(0)		(198)	(0)		0.043	0	
-184			1.0				70				
(-62)			(0)				(24)			0.040	
L.A.				40			-				0.022
				(7)							

Purseglove No. 15 Mine

There were ten dewatering points for the Purseglove No. 15 Mine complex. Four of these discharges were located on Pedlar Run, a tributary to Dunkard Creek and the remaining six were located on tributaries to Scotts Run. The discharges on Dunkard Creek tributaries were all located in the West Virginia portion of the watershed (see sketch on page 63). The water quality data is included in the table on pages 65, 66 and 67.

The Lemley Shaft was located on Dolls Run, and the Core Shaft was located on Pedlar Run. Dolls Run is a tributary to Pedlar Run which, in turn, is a tributary to Dunkard Creek. At the time of survey, the Core Shaft had only recently been completed and was not yet in actual use. The discharges from this shaft and from the Lemley were highly alkaline and carried total iron concentrations of 1 mg/l or less. Accordingly, there were no visible effects upon the water quality of the respective receiving streams.

The Fetty Borehole was located on a small unnamed tributary to Dunkard Creek. On both sampling occasions, the net alkalinity was more than 400 mg/l with an attendant iron concentration of 0.5 mg/l. At one time, lime neutralization was supplied at the Fetty site. However, as a result of underground blending of various mine waters, the resultant mixture, which was pumped to the surface, required only settlement prior to discharge.

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The Muffly Shaft discharge was also located on an unnamed tributary to Dunkard Creek. On both sampling occasions, the pH value was above 7.5. During the first sampling, the total iron concentration was 5 mg/l and on the second sampling, the concentration was 1 mg/l.

The poor quality effluents from the Purseglove Mine were discharged to Scotts Run, a direct tributary to the Monongahela River. In downstream order, Main West and the Jere Drain were the first to enter Scotts Run.

A total of three samples were collected from the Main West discharge. The pH values ranged from 2.8 to 3.4 and the acidity concentration varied from 840 mg/l to 1,830 mg/l. The corresponding iron levels were also high. Above the point of influent, the receiving tributary exhibited pH values above 7.0 with a net alkalinity exceeding 200 mg/l. Below the Main West discharge, the stream was acid (125 mg/l) and carried a total iron concentration of 80 mg/l.

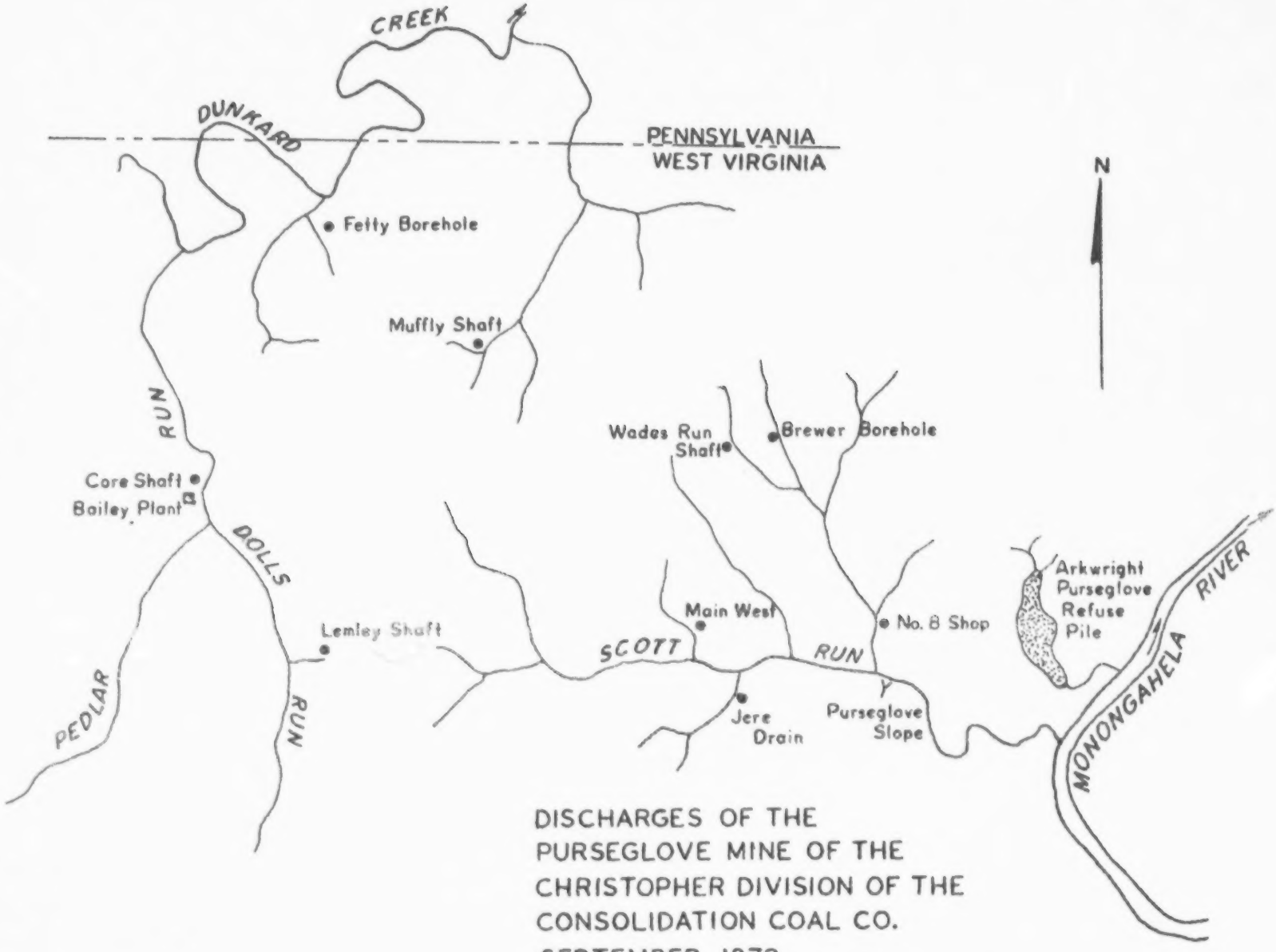
The Jere Drain was also responsible for the water quality degradation of the receiving stream on which it was located. An acid load of approximately 1.5 tons per day was discharged by this pump. The pH value of the small receiving tributary was reduced from 7.5 to 3.0 and a net alkalinity of 130 mg/l was depleted to a resultant net acidity concentration of 965 mg/l.

The Wades Run Shaft, Brewer Borehole and the No. 8 Shop discharge were all located on Wades Run. The Wades Run Shaft and Brewer Borehole effluents were highly mineralized and contributed significant acid discharges. Above the Wades Run Shaft discharge, the receiving stream exhibited a net alkalinity of 141 mg/l. Below the point of discharge, this stream carried a net acidity of 6,000 mg/l. In a similar manner, the Brewer Borehole was responsible for a change in the instream alkalinity of 171 mg/l to a resultant net acidity of 3,290 mg/l below the borehole site. High iron loads were also contributed by these two discharge sites. The No. 8 Shop Discharge was alkaline on both sampling occasions.

The last discharge to Scotts Run from this mine was the Purseglove Slope adjacent to Route 19 north of Morgantown, West Virginia. The discharge was pumped, and the pump operated somewhat infrequently. For this reason, only one sample was collected from this point. The pH value was 2.2 with an acidity concentration of 3,450 mg/l.

At the time of survey, a new mine drainage treatment facility was under construction for the Purseglove Mine. Although not officially named at the time, this facility was referred to by Consol personnel as the Bailey Treatment Plant. The mine water entering this site was neutralized by lime (hand feed) and directed to one large settling pond. There was no discharge at the time of visit. It was reported that, at least in part, this facility will treat some of the water which had previously been pumped to the Fetty Borehole.

The location of this new facility was on Pedlar Run, only a short distance from the Core Shaft. There were no additional treatment facilities in operation at the Purseglove No. 15 Mine at the time of survey.



DISCHARGES OF THE
PURSEGLOVE MINE OF THE
CHRISTOPHER DIVISION OF THE
CONSOLIDATION COAL CO.
SEPTEMBER, 1972

Purseglove No. 15 Mine

Sample Location	Refuse Act Permit No. OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron 3/72	Total Iron 9/
to Scotts Run									
Scotts Run upstream				7.1			-94 (-169)		
upstream			7.2	7.5		-237 (-3)	-246 (-27)		0.5 (0)
Main West Borehole	113	3.4	3.1	2.8	1,660 (398)	1,830 (6,589)	840 (1,260)	30 (7)	58 (2,08
downstream			6.4			125 (452)			8 (28
upstream			7.5	7.3		-130 (-31)	-233 (-28)		0.5 (0)
Jere Drain	122	3.0	2.9	2.5	3,510 (3,159)	2,815 (-)	5,400 (2,850)	750 (675)	78 (-)
downstream			3.0			965 (-)			29 (-)
upstream			7.8			-141 (-34)			0.5 (0)
Wades Run Shaft	143	2.7	2.4		5,675 (681)	4,995 (17,982)		1,000 (120)	1,80 (6,48
downstream			2.4			6,000 (23,040)			1,90 (7,29
upstream			7.7	6.9		-171 (-17)	-186 (-9)		0.5 (0)

Purseglove No. 15 Mine

pH 3/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron mg/l (lb/day) 3/72	Total Iron mg/l (lb/day) 9/72	Total Iron mg/l (lb/day) 10/72	Sulfates mg/l (lb/day) 3/72	Sulfates mg/l (lb/day) 9/72	Sulfates mg/l (lb/day) 10/72	Flow (mgd) 3/72	Flow (mgd) 9/72	Flow (mgd) 10/72
				-94			2						
	7.1			(-169)			(4)						0.216
			-237	-246		0.5	0		120				
	7.5		(-3)	(-27)		(0)	(0)		(1)			0.001	0.013
		1,660	1,830	840	30	580	160	3,000	3,525				
	2.8	(398)	(6,589)	(1,260)	(7)	(2,088)	(240)	(720)	(12,690)		0.029	0.432	0.180
			125			80			720				
			(452)			(289)			(2,601)			0.433	
			-130	-233		0.5	0.5		315				
	7.3		(-31)	(-28)		(0)	(0)		(76)			0.029	0.014
		3,510	2,815	5,400	750	780	840	4,425	4,125				
	2.5	(3,159)	(-)	(2,850)	(675)	(-)	(444)	(3,983)	(-)		0.108		0.063
			965			290			1,505				
			(-)			(-)			(-)				
			-141			0.5			240				
			(-34)			(0)			(58)			0.029	
		5,675	4,995		1,000	1,800		6,875	6,700				
		(681)	(17,982)		(120)	(6,480)		(825)	(24,120)		0.014	0.432	
			6,000			1,900			5,300				
			(23,040)			(7,296)			(20,352)			0.461	
			-171	-186		0.5	0.5		30				
	6.9		(-17)	(-9)		(0)	(0)		(3)		0.012	0.006	

Purseglove No. 15 Mine (continued)

Sample Location	Refuse Act Permit No. OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron mg/l (lb/day) 3/72	Total Iron mg/l (lb/day) 9/72	Total Iron mg/l (lb/day) 10/72
Brewer Borehole	145	3.0	2.7	2.4	2,825 (23,730)	3,410 (38,465)	3,330 (57,662)	150 (1,260)	1,300 (14,664)	360 (6,234)
downstream			2.8			3,290 (37,427)			1,300 (14,789)	
upstream			3.3			520 (125)			180 (43)	
No. 8 Shop		7.5	7.0		-148 (-355)	-257 (-690)		1.0 (2)	5 (13)	
downstream			7.0			-199 (-583)			25 (73)	
Purseglove Slope	109	2.2			3,450 (1,449)			500 (210)		
Scotts Run @ Mouth				3.2			1,890 (38,900)		L.A.	
to Dunkard Creek										
Lemley Shaft		5.5	7.0		-98 (-17)	-101 (-10)	-	0.5 (0)	1.0 (0)	
upstream			6.8		-191 (-1,134)				L.A.	
Core Shaft		7.8	7.4		-298 (-358)	-114 (-369)		1.0 (1)	0.5 (2)	
downstream			7.4			-297 (-2,712)			0.5 (5)	
upstream			7.7			-128 (-9)			0.5 (0)	

seglove No. 15 Mine (continued)

B

Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
2,825	3,410	3,330	150	1,300	360	4,275	4,575				
(3,730)	(38,465)	(57,662)	(1,260)	(14,664)	(6,234)	(35,910)	(51,606)		1.01	1.354	2.078
	3,290			1,300			4,425				
	(37,427)			(14,789)			(50,339)			1.365	
	520			180			1,435				
	(125)			(43)			(344)			0.029	
-148	-257		1.0	5		320	345				
(-355)	(-690)		(2)	(13)		(768)	(927)		0.288	0.323	
	-199			25			405				
	(-583)			(73)			(1,186)			0.351	
3,450			500			4,000					
(1,449)			(210)			(1,680)			0.050		
		1,890		L.A.							
		(38,900)									2.468
-98	-101		0.5	1.0		240	240				
(-17)	(-10)	-	(0)	(0)		(43)	(23)		0.022	0.012	
-191				L.A.			1,480				
(-1,134)							(8,720)			0.707	
-298	-114		1.0	0.5		260	260				
(-358)	(-369)		(1)	(2)		(312)	(842)		0.144	0.389	
	-297			0.5			990				
	(-2,712)			(5)			(9,041)			1.096	
	-128			0.5			50				
	(-9)			(0)			(4)			0.009	

Purseglove No. 15 Mine (continued)

Sample Location	Refuse Act Permit No OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron mg/l (lb 3/72	Total Iron mg/l (lb 9/72
Muffly Shaft	138	7.9	7.7		L.A. (-)	-170 (-37)	-	5 (-)	1.0 (0)
upstream			7.6			-54 (-3)		0.5 (0)	
Fetty Borehole	106	10.7	7.5		-451 (-6,494)	-567 (-6,491)		0.5 (7)	0.5 (6)
downstream			7.6			-518 (-5,955)			0.5 (6)

Purseglove No. 15 Mine (continued)

	Net Acidity mg/l (lb/day)			Total Iron mg/l (lb/day)			Sulfates mg/l (lb/day)			Flow (mgd)		
0/72	3/72	9/72	10/72	3/72	9/72	10/72	3/72	9/72	10/72	3/72	9/72	10/72
	L.A.	-170		5	1.0		95	60				
	(-)	(-37)	-	(-)	(0)	-	(-)	(13)			0.026	
		-54		0.5				35				
		(-3)		(0)				(2)			0.006	
	-451	-567		0.5	0.5		2,625	2,325				
	(-6,494)	(-6,491)		(7)	(6)		(37,800)	(26,617)		1.73	1.374	
		-518			0.5			2,325				
		(-5,955)			(6)			(26,728)			1.380	

Osage No. 3 Mine

Four of the six discharges from the Osage No. 3 Mine were located on tributaries to the West Virginia portion of Dunkard Creek. These tributaries are Statler Run, Pedlar Run, and Dolls Run (a tributary to Pedlar Run). The remaining two discharges were located on tributaries to Dents Run (see sketch on page 71). The water quality data is included in the table on page 73.

The discharge from the Dolls Run Portal exhibited a net acidity of 122 mg/l on one occasion and a net alkalinity of 306 mg/l at a second sampling. On both sampling occasions, the total iron concentration was 0.5 mg/l. There was no visible change in the water quality of Dolls Run below the effluent from the Dolls Run Portal.

The Lemley Siding discharge was also located on Dolls Run only a short distance below the Dolls Run Portal. When first sampled, this discharge exhibited a net acidity but when sampled again, it exhibited a net alkalinity. On both occasions, the iron concentrations were more than 60 mg/l. Stream samples taken at the time of the second sampling indicated a background iron concentration in Dolls Run of 2 mg/l above the influent of Lemley Siding. Below this point (downstream), Dolls Run carried a total iron concentration of 200 mg/l. As would be expected, this discharge was responsible for a noticeable discoloration in Dolls Run.

The Pedlar Run borehole was alkaline at both samplings. It exhibited pH values above 7.0 and net alkalinity. The iron concentrations at this point ranged from 7 mg/l to 12 mg/l; however, due to

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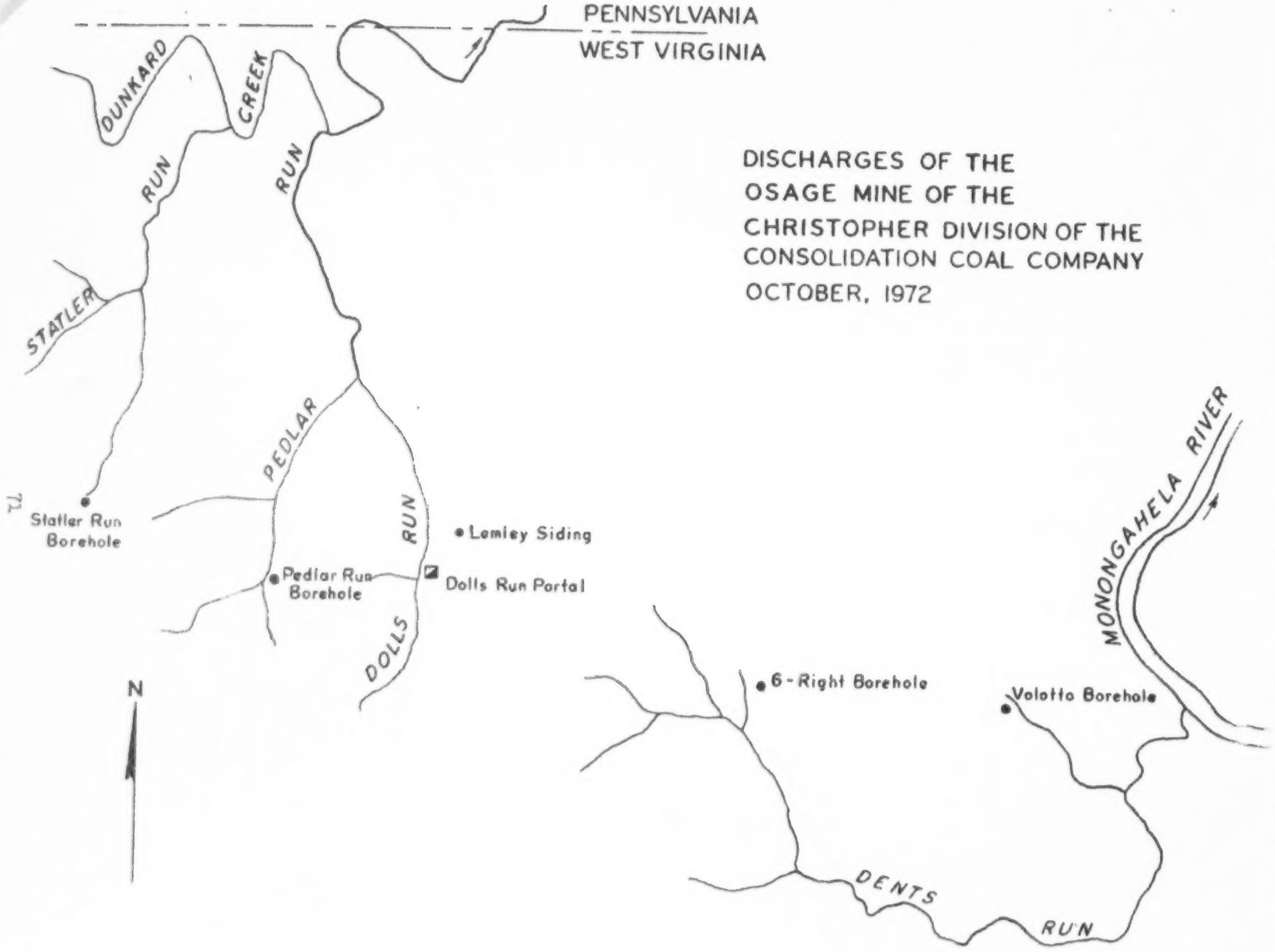
the low discharge rate from the equalization pond, the effects upon the receiving stream were negligible.

The Statler Run borehole was located at the headwaters of an unnamed tributary to Statler Run. Only one sample was collected from this discharge point. The pH value was 8.4 and it carried an iron concentration of only 0.5 mg/l.

The two remaining dewatering points for the Osage No. 3 Mine were located on tributaries to Dents Run. These were the 6-Right Borehole and the Volotto Borehole. At the present time, the Dents Run area is the subject of a cooperative effort to abate all types of pollution in the watershed. A brief description of the Dents Run Project will be found under the section of this report dealing with the Arkwright Mine.

Coal produced at the Osage Mine was cleaned and sized at a preparation plant on the Monongahela River. This was the Arkwright Preparation Plant, which processed coal from the Osage and Arkwright Mines. It is described in the section of this report about the Arkwright Mine.


PENNSYLVANIA
WEST VIRGINIA
DUNKARD CREEK RUN
RUN
STATLER
PEDLAR
RUN
DOLLS
RUN
Statler Run Borehole
Pedlar Run Borehole
Lemley Siding
Dolls Run Portal
6 - Right Borehole
Volotto Borehole
MONONGAHELA RIVER
DENTS RUN
N
DISCHARGES OF THE
OSAGE MINE OF THE
CHRISTOPHER DIVISION OF THE
CONSOLIDATION COAL COMPANY
OCTOBER, 1972

A

Osage No. 3 Mine

Sample Location	Refuse Act Permit No. OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron 3/72	Total Iron 9/
					Osage No. 3 Mine				
to Dunkard Creek									
Statler Run	134	8.4			-349 (-42)			0.5 (0)	
upstream			7.4			-144 (-52)			1 (
Dolls Run Portal	140	7.9	7.4		122 (29)	-306 (-40)		0.5 (0)	0 (
downstream			7.4			-164 (-132)			2 (
Lemley Siding	135	6.2	6.8		503 (604)	-97 (-349)		62 (74)	1 (
downstream			7.1			-119 (-524)			2 (
upstream			7.4			-179 (-26)			0 (
Pedlar Run	133	7.6	7.2		-18 (-2)	-133 (-13)		12.0 (1)	1 (
downstream			7.3			-175 (-42)			1 (
to Dents Run									
6-Right Borehole	125	2.8			5,565 (10,000)			1,000 (1,800)	
Volotto Borehole	124	5.3			1,900 (684)			200 (72)	

Osage No. 3 Mine

B

0/72	Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
	Osage No. 3 Mine											
	-349 (-42)			0.5 (0)			225 (27)			0.014		
		-144 (-52)			1.0 (0)			50 (18)			0.043	
	122 (29)	-306 (-40)		0.5 (0)	0.5 (0)		85 (20)	50 (7)		0.029	0.016	
		-164 (-132)			2.0 (2)			50 (40)			0.096	
	503 (604)	-97 (-349)		62 (74)	160 (576)		4,000 (4,800)	4,100 (14,800)		0.144	0.432	
		-119 (-524)			200 (881)			3,000 (13,200)			0.528	
		-179 (-26)			0.5 (0)			40 (6)			0.017	
	-18 (-2)	-133 (-13)		12.0 (1)	7.0 (1)		625 (75)	2,250 (216)		0.014	0.012	
		-175 (-42)			1.0 (0)			675 (162)			0.029	
	5,565 (10,000)			1,000 (1,800)			6,250 (11,200)			0.216		
	1,900 (684)			200 (72)			3,150 (1,130)			0.043		

Arkwright No. 1 Mine

The Arkwright Mine pumped water to the surface at nine locations during the initial survey. Refuse piles associated with the mine also discharged at two locations. The water quality at all locations, except the Hagans Portal, continued to be poor. Discharge locations are shown on the sketch; water quality is listed in the table on pages 81, 82 and 83. Two of the boreholes carried water from an abandoned mine over the Arkwright Mine in another coal seam. The overlying inactive Brock No. 4 Mine was dewatered at the Little Indian Creek Borehole and the Snider Borehole. The Booth Borehole pumped water from the inactive Booth Mine which adjoins the Arkwright Mine in the same coal seam. These three discharges were protective pumping operations which removed water from adjacent or overlying inactive mines before it entered the Arkwright Mine.

The idea of preventing water from entering the active mine workings is the basis for the Dents Run Demonstration Project. This $2 million project is a cooperative effort of the State and Federal governments and the Consolidation Coal Company. This project is to stop pollution from sewage and mines as well as land pollution. The project will reclaim strip mines which intercept surface water runoff and channel it into mine openings connecting with underground active mines. The two active mines which receive this water are the Arkwright Mine and the Osage Mine. These mines pump an average of 3 million gallons of untreated mine water to Dents Run each day.

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The project will reduce the amount of water which has to be pumped, and it will provide treatment for the water which is discharged to Dents Run.

Discharges in the Dents Run watershed are described here first. The Snider Borehole, earlier called a protective pumping operation, was the largest volume discharge at over 2 million gallons per day. The pH was 6.2, net acidity 200 mg/l (4100 lb/day), and iron 140 mg/l (2900 lb/day) when sampled in the spring of 1972.

The Loar Borehole water quality reportedly varied significantly with the amount of surface water entering the mine. When sampled in the spring of 1972, the discharge had a pH of 5.6, a net acidity of 3410 mg/l (16,400 lb/day) and iron of 750 mg/l (3600 lb/day). It had the greatest net acid load of any discharge to Dents Run. The Laurel Point borehole had not been pumped for several months as part of the demonstration project. The Hess Borehole discharge had a pH of 2.6, a net acidity of 5,030 mg/l (6,040 lb/day) and iron of 1,000 mg/l (1200 lb/day) when sampled in March 1972.

The Osage Mine discharges to Dents Run were the Volotto Borehole and the 6-Right Borehole. The pH of the 6-Right discharge was 2.8, net acidity 5,565 mg/l (10,000 lb/day) and iron 1000 mg/l (1800 lb/day). Volotto water quality was better with a pH of 5.3, net acidity of 1,900 mg/l (684 lb/day) and iron of 200 mg/l (72 lb/day). At the completion of the Dents Run Project, only the Loar Borehole will discharge water to Dents Run. The water is to be channelled to

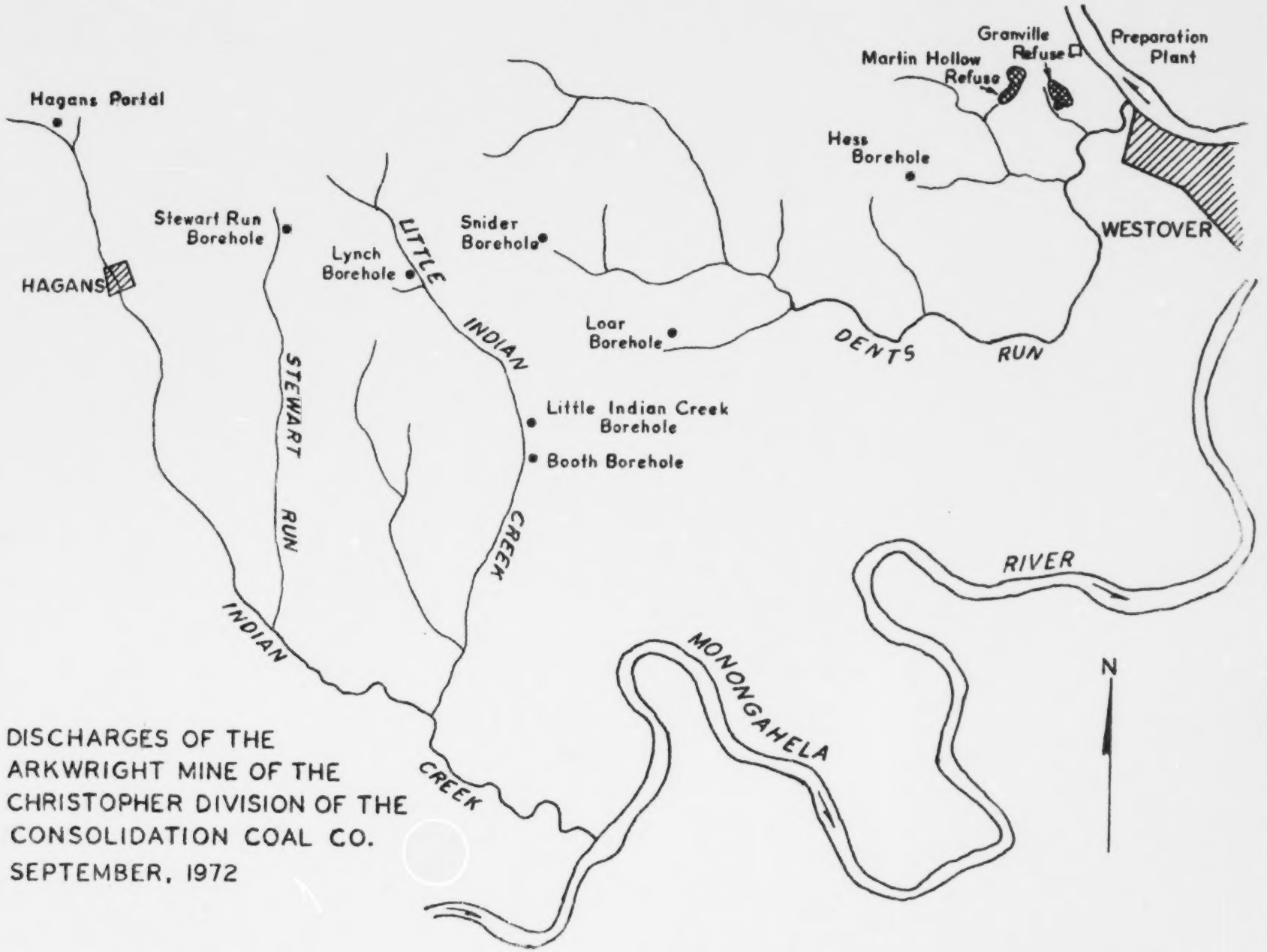
the abandoned Brock Mine in the Sewickley coal seam and flow underground to a new treatment facility (Sears facility) being installed in the adjacent Indian Creek watershed. The Loar Borehole has a treatment facility which should begin discharging treated water to Dents Run about March or April 1973. The two discharges from the refuse piles of the Arkwright Mine are also to be stopped. The Granville Refuse Pile discharge had a pH of 5.5, net acidity of 7,150 mg/l (2,570 lb/day) and iron of 3,000 mg/l (1,080 lb/day). The Martin Hollow Refuse Pile had a pH of 4.8, net acidity of 3,875 mg/l (1,070 lb/day) and iron of 1,000 mg/l (276 lb/day). Dents Run should experience a rapid improvement in water quality when the active mine discharges of acid water are halted.

Indian Creek, an adjacent watershed, was also severely polluted by discharges of acid water from the Arkwright Mine. Little Indian Creek, a tributary in this watershed, was grossly discolored, choked with iron sludge, and acid over four-fifths of its length as a result of discharges from the Lynch Borehole, the Little Indian Creek Borehole and the Booth Borehole.

The naturally alkaline stream was first degraded by the Lynch Borehole discharge with a pH from 2.6 to 3.4, net acidity of 6,000 mg/l and iron concentration of 2,200 mg/l. The Little Indian Creek Borehole, just downstream, added water with a pH from 2.' to 3.3, net acidity of 4,200 mg/l, and iron of 1,500 mg/l. Further downstream, the water quality was so bad that the Booth Borehole discharge, with a pH of 4.4, actually improved the pH of Little Indian Creek from 2.7 to 3.7 in

September of 1972. However, the discharge had a net acidity of 2,015 mg/l and an iron of 1,050 mg/l, which did degrade the stream. Stewart Run was polluted for its entire length by the Stewart Run Borehole discharge which had a pH from 3.6 to 6.5, net acidity of 780 mg/l (1,800 lb/day) and iron of 480 mg/l (1,100 lb/day). The Stewart Run Borehole of the No. 93 Mine near the mouth of Stewart Run added to the pollution of this small tributary to Indian Creek. The discharge from the Hagans Portal was the only Arkwright Mine discharge having acceptable water quality. The pH (from 6.9 to 7.8), net alkalinity and low iron content of the water did not visibly degrade Indian Creek.

Indian Creek was grossly polluted by discharges from the Arkwright and No. 93 Mine. At its mouth, it was brilliant red-orange and void of normal aquatic life. The pH was near 3.2; the net acidity concentration was over 1,000 mg/l; and the iron concentration was over 500 mg/l. Active mine discharges were the main source of this pollution.



DISCHARGES OF THE ARKWRIGHT MINE OF THE CHRISTOPHER DIVISION OF THE CONSOLIDATION COAL CO.
SEPTEMBER, 1972

A

Arkwright No. 1 Mine

Sample Location	Refuse Act Permit No. OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron mg/l (lb) 3/72	Total Iron mg/l (lb) 9/72	mg/l (lb)
to Indian Creek										
upstream			7.1			-73 (-7)			1.4 (0)	
Hagans Portal	105	7.8	6.9		-79 (-71)	-153 (-55)		1.0 (1)	0.6 (0)	
downstream			7.0			-131 (-60)			1.0 (0)	
upstream			6.7	7.3		-81 (-10)	-103 (-5)		7 (1)	
Stewart Run Borehole	139	6.5	3.6	3.7	765 (1,840)	870 (1,880)	698 (1,680)	700 (1,680)	440 (950)	
downstream* (far)			2.9			625 (4,910)			45 (354)	
upstream			6.8	7.3		-178 (-36)	-164 (-16)		0 (0)	
Lynch Borehole	112	2.6	3.0	3.4	6,160 (1,550)	5,725 (687)	L.A.	1,600 (403)	2,300 (276)	2, (1,
downstream*			3.2			650 (468)			210 (151)	
upstream			2.7			750 (1,270)			1,500 (2,540)	

*Flows do not add due to other streams entering the stream between sample points.

Arkwright No. 1 Mine

B

0/72	Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
		-73 (-7)			1.4 (0)			15 (1)			0.012	
	-79 (-71)	-153 (-55)		1.0 (1)	0.6 (0)		90 (81)	15 (5)		0.108	0.043	
		-131 (-60)			1.0 (0)			20 (9)			0.055	
7.3		-81 (-10)	-103 (-5)		7 (1)	1 (0)		40 (5)			0.014	0.006
3.7	765 (1,840)	870 (1,880)	698 (1,680)	700 (1,680)	440 (950)	300 (720)	5,375 (12,900)	3,900 (8,420)		0.288	0.259	0.288
		625 (4,910)			45 (354)			2,400 (18,900)			0.943	
7.3		-178 (-36)	-164 (-16)		0 (0)	1 (0)		45 (9)			0.024	0.012
3.4	6,160 (1,550)	5,725 (687)	L.A.	1,600 (403)	2,300 (276)	2,700 (1,650)	11,500 (2,898)	5,500 (660)		0.030	0.014	0.073
		650 (468)			210 (151)			1,725 (1,240)			0.086	
		750 (1,270)			1,500 (2,540)			1,230 (2,080)			0.203	

the stream between sample points.

A

Acid Mine No. 1 Mi - (continued)

Sample Location	Refuse Act Permit No. OXJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron mg/l (lb/day) 3/72	Total Iron mg/l (lb/day) 9/72	Total Iron mg/l (lb/day) 10/72
Little Indian Creek Borehole	146	2.7	2.7	3.3	5,315 (12,800)	3,770 (23,800)	3,395 (12,200)	1,400 (3,360)	1,500 (9,490)	1,700 (6,120)
downstream			2.7			2,875 (23,000)			1,100 (8,820)	
upstream			2.7			1,695 (5,450)			500 (1,608)	
Booth Borehole	127	4.7	4.4		2,210 (36,500)	2,015 (70,100)		750 (12,400)	1,050 (36,500)	
downstream			3.7			665 (25,300)			1,100 (41,800)	
Indian Creek @ Mouth			3.1	3.3		1,925 (74,500)	1,078 (24,100)		520 (20,100)	560 (12,500)
to Dents Run										
Snider Borehole		6.2			200 (4,080)			140 (2,860)		
Loar Borehole	147	5.6			3,410 (16,400)			750 (3,600)		
Laurel Point	128	-				-			-	
Hess Borehole	126	2.6			5,030 (6,040)			1,000 (1,200)		
Granville Refuse Pile		5.5			7,150 (2,570)			3,000 (1,080)		

B

Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
5,315 (12,800)	3,770 (23,800)	3,395 (12,200)	1,400 (3,360)	1,500 (9,490)	1,700 (6,120)	6,100 (14,640)	3,400 (21,500)		0.288	0.759	0.432
	2,875 (23,000)			1,100 (8,820)			3,300 (26,500)			0.962	
	1,695 (5,450)			500 (1,608)			2,240 (7,204)			0.386	
2,210 (36,500)	2,015 (70,100)		750 (12,400)	1,050 (36,500)		4,050 (66,800)	3,350 (116,500)		1.98	4.173	
	665 (25,300)			1,100 (41,800)			3,250 (123,000)			4.559	
	1,925 (74,500)	1,078 (24,100)		520 (20,100)	560 (12,500)		3,825 (140,000)			4.645	2.680
200 (4,080)			140 (2,860)			875 (17,800)			2.448		
3,410 (16,400)			750 (3,600)			4,950 (23,800)			0.576		
-			-			-				-	
5,030 (6,040)			1,000 (1,200)			5,200 (6,240)			0.144		
7,150 (2,570)			3,000 (1,080)			9,500 (3,420)			0.043		

Sample Location	Refuse Act Permit No. PAJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron 3/72	Total Iron 9/7
Martin Hollow Refuse Pile		4.8			3,875 (1,070)			1,000 (276)	
to Monongahela River									
Arkwright Prep. Plant	142								

Arkwright No. 1 Mine (continued)

Net Acidity mg/l (lb/day)			Total Iron mg/l (lb/day)			Sulfates mg/l (lb/day)			Flow (mgd)		
3/72	9/72	10/72	3/72	9/72	10/72	3/72	9/72	10/72	3/72	9/72	10/72
3,875 (1,070)			1,000 (276)			5,200 (1,440)			0.033		

Mountaineer No. 93 Mine

The No. 93 Mine pumped water to the surface at six locations (table on pages 89 and 90 and the sketch on page 88). Only one of those locations had any facility for treating the discharge. That site was the Hagans Shaft pump which provided aeration and sedimentation for iron removal and flow equalization. The Hagans Shaft discharge had a pH from 6.5 to 6.9, net alkalinity of 230 mg/l (250 lb/day) and iron of 6 mg/l (9 lb/day). The iron content slightly discolored the receiving stream, Indian Creek, and the stream bed in the vicinity of the discharge. The Balcar Borehole discharged directly to a small naturally alkaline tributary to Indian Creek. The tributary and Indian Creek were grossly polluted by the Balcar discharge. The pH of the Balcar discharge varied from 3.1 to 4.3, average net acidity was 1,100 mg/l and average iron was 400 mg/l.

The Stewart Run Borehole contributed to the severely polluted condition of Stewart Run resulting from the Arkwright Mine discharge, upstream on Stewart Run. The Stewart Run discharge from the No. 93 Mine had a pH from 4.1 to 5.5, net acidity averaged 620 mg/l and the average iron concentration was 250 mg/l. The No. 93 Mine and the Arkwright Mine caused gross pollution in the Indian Creek watershed.

The 6-South Borehole discharged water with a pH of 3.0, net acidity of 2,170 mg/l and 55 mg/l of iron when visited in the spring of 1972. In June of that year, a new borehole was drilled to the

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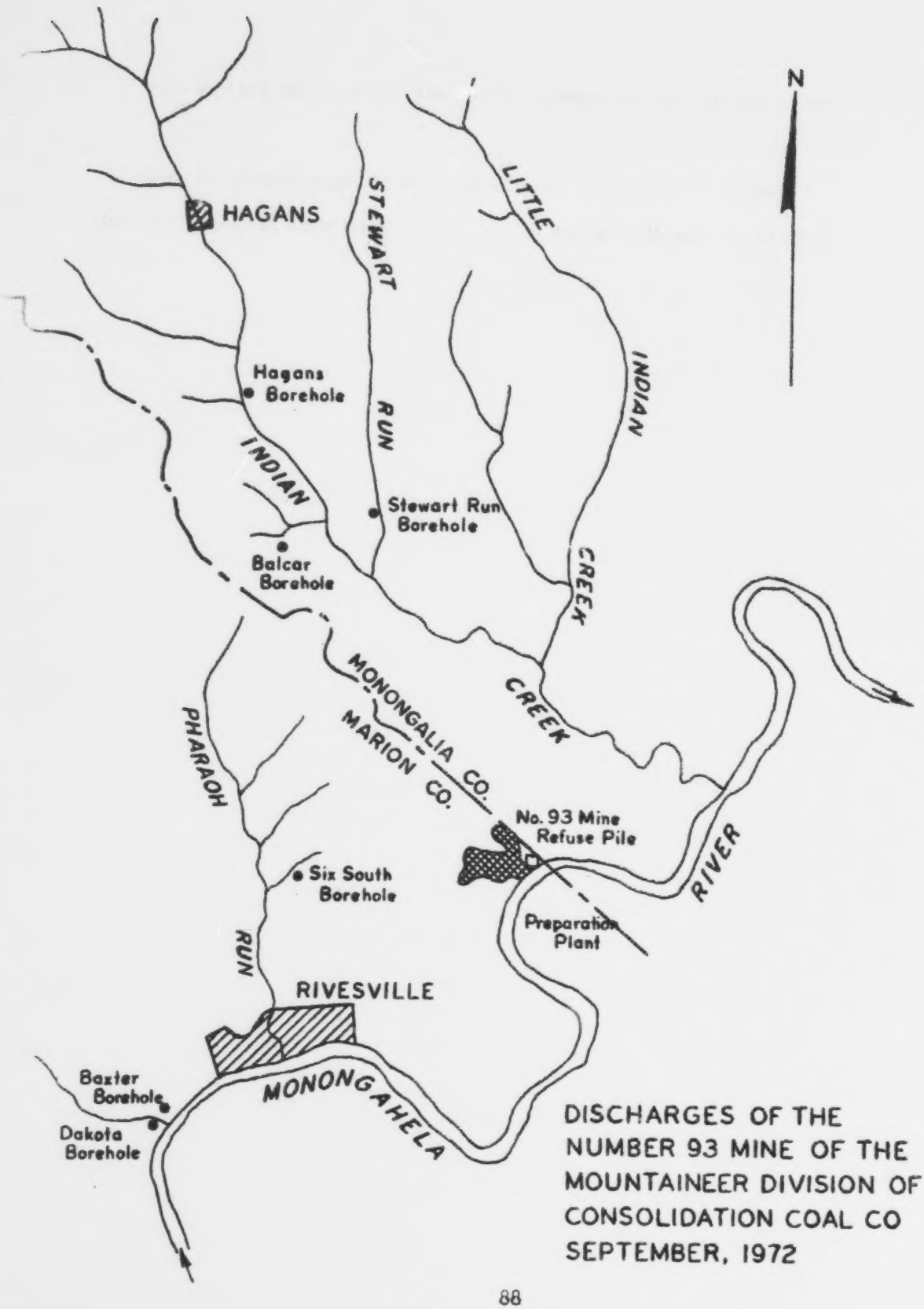
abandoned Sands Mine which is in an overlying coal seam. Water from 6-South was diverted to this borehole resulting in a great improvement in water quality in Pharoah Run, the previous receiving stream.

A similar improvement in stream water quality was noted in Paw Paw Creek near Rivesville, West Virginia when the No. 93 Mine moved two discharge points closer to the Monongahela River. These flows, the Dakota and the Baxter discharges, had previously caused Paw Paw Creek to be highly colored and devoid of aquatic life downstream from the point of discharge. These two discharges were relocated to within 100 yards of the Monongahela River. The Dakota Borehole discharge had a pH of 5.8 and 6.6, a net alkalinity concentration of 300 mg/l, and 50 mg/l and 730 mg/l of iron when sampled. The Baxter discharge had a pH of 5.5 and 6.8, net acidity concentration of 445 mg/l, and 55 mg/l and 400 mg/l of iron when sampled.

The preparation plant and refuse pile of the No. 93 Mine were also noted as pollution sources. The refuse pile discharge had a pH of 5.3 on the first visit and 6.5 on the second visit. The discharge was acidic (345 mg/l) at the first visit, but was alkaline at the second sampling. Iron was excessive on both occasions (50 mg/l and 100 mg/l). Coal fines were visible in a discharge from the preparation plant when visited in August, 1972. The suspended solids content was 49,000 mg/l in this discharge. The "blackwater" pollution

was entering the Monongahela River and discoloring part of the river.

Indian Creek should experience a rapid improvement in water quality if the discharges of the No. 93 Mine were properly treated.



DISCHARGES OF THE NUMBER 93 MINE OF THE MOUNTAINEER DIVISION OF THE CONSOLIDATION COAL CO SEPTEMBER, 1972

A

No. 93 Mine

Sample Location	Refuse Act Permit No. OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron 3/72	Total Iron 9/7
to Indian Creek									
upstream			6.8	6.8		-158 (-264)	-145 (-63)	-	1 (2
Hagans Shaft Pump	202	6.9	6.5	6.9	-126 (-266)	-258 (-123)	-295 (-365)	10 (21)	3 (1
downstream			6.7			-182 (-391)			1 (4
upstream			7.2	6.5		-116 (-7)	-120 (-3)	-	1 (0
Balcar Borehole	209	4.3	3.1	3.9	950 (2,960)	1,350 (4,860)	1,115 (-)	55 (172)	60 (2,1
downstream			3.1			1,000 (3,660)			4 (1,7
upstream*			3.1	7.3		300 (994)	-103 (-5)		(1
Stewart Run Borehole	203	4.1	4.2	5.5	735 (3,240)	600 (9,610)	518 (2,240)	55 (243)	3 (6,0
downstream			3.6			545 (10,500)			3 (6,3
Indian Creek at Mouth			3.1	3.3		1,925 (74,500)	1,078 (24,100)		5 (20,1

*Sample of 3/72 taken just upstream, sample of 9/72 taken at headwaters upstream of Stewarts

No. 93 Mine

B

	Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
72												
		-158	-145		1	1		80				
8		(-264)	(-63)	-	(2)	(0)		(133)			0.200	0.052
	-126	-258	-295	10	3	5	1,350	1,950				
9	(-266)	(-123)	(-365)	(21)	(1)	(6)	(2,850)	(936)		0.253	0.058	0.148
		-182			1			590				
		(-391)			(2)			(1,270)			0.258	
		-116	-120		1	0.5		70				
5		(-7)	(-3)	-	(0)	(0)		(4)			0.007	0.003
	950	1,350	1,115	55	600	600	2,650	4,125				
9	(2,960)	(4,860)	(-)	(172)	(2,160)	(-)	(8,270)	(14,800)		0.374	0.432	
		1,000			480			2,650				
		(3,660)			(1,760)			(9,700)			0.439	
		300	-103		60	1		3,525				
3		(994)	(-5)		(199)	(0)		(11,700)			0.397	0.006
	735	600	518	55	380	320	2,800	3,825				
5	(3,240)	(9,610)	(2,240)	(243)	(6,090)	(1,390)	(12,400)	(51,700)		0.530	1.922	0.520
		545			330			3,225				
		(10,500)			(6,380)			(62,300)			2.320	
		1,925	1,078		520	560		3,825				
3		(74,500)	(24,100)		(20,100)	(12,500)		(140,000)			4.645	2.680

/72 taken at headwaters upstream of Stewarts Run Borehole to the Arkwright Mine of Consol.

A

No. 93 Mine (continued)

Sample Location	Refuse Act Permit No. OXJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron mg/l (lb/day) 3/72	Total Iron mg/l (lb/day) 9/72	Total Iron mg/l (lb/day) 10/72
to Pharoah Run										
6-South Borehole	204	3.0	-	-	2,170 (6,770)			55 (172)		
to small tribs. to Monongahela River										
upstream		-	7.6	-	-	-231 (-)	-	-	0.3	-
Dakota Borehole	205	5.8	6.6		-275 (-1,160)	-304 (-)	-	50 (210)	730 (-)	-
downstream			6.8		-	-266 (-)	-	-	710 (-)	-
Baxter Borehole	206	5.5	6.8	-	440 (1,360)	450 (-)		55 (170)	400 (-)	-
upstream			6.7		-110 (-8)	-	-	-	26 (2)	-
No. 93 Refuse Pile		5.3	6.5		345 (166)	-3 (-2)	-	50 (24)	100 (67)	-
No. 93 Prep. Plant	210		7.0							
downstream			6.5		-571 (-711)				120 (167)	

	Solids mg/l - 9/5/72 Susp.	Total
Upstream	259	4,243
No. 93 Preparation Plant	49,280	50,120
Downstream	32,520	33,865

No. 93 Mine (continued)

B

Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
2,170 6,770)			55 (172)			2,950 (9,200)			0.374		
-	-231 (-)	-	-	0.3	-	-	130	-		0.065	
-275 ,160)	-304 (-)	-	50 (210)	730 (-)	-	1,750 (7,350)	2,325 (-)		0.504		
-	-266 (-)	-	-	710 (-)	-	-	2,175 (-)		-		
440 1,360)	450 (-)		55 (170)	400 (-)	-	3,600 (11,100)	4,275 (-)	-	0.370		
-110 (-8)	-	-	-	26 (2)	-	1,800 (130)				0.009	
345 (166)	-3 (-2)	-	50 (24)	100 (67)	-	1,380 (662)	1,260 (847)	-	0.058	0.081	
										0.086	
-571 (-711)				120 (167)			875 (1,218)			0.167	

	Solids mg/l - 9/5/72 Susp.	Total
	259	4,243
tion Plant	49,280	50,120
	32,520	33,865

Loveridge No. 22 Mine

A total of seven discharge sites were sampled at the Loveridge No. 22 Mine. The discharges were located on Paw Paw Creek and on tributaries to Pyles Fork which is a tributary to Buffalo Creek. Four of the mine effluents were pumped discharges and three were gravity discharges from mine refuse disposal areas (see sketch on page 94 and table on pages 95 and 96).

In streamflow order, the Harvey Run Shaft was the first source of mine drainage to enter Paw Paw Creek. The discharge was highly alkaline with a very low total iron concentration. The discharge did not visibly alter the water quality of Harvey Run. The four remaining discharges were located on Sugar Run, a tributary to Paw Paw Creek.

The water quality in the headwaters area of Sugar Run was affected by cumulative seepage from coal refuse areas. The stream was acid at this point on both sampling periods. Downstream from this point, the South Side Refuse Pile contributed the next discharge. Cumulative seepage contributed an acid load of 307 lb/day at the first sampling. In the intervening time period between the first and second samplings, construction began on a small holding pond at the base of the South Side Refuse Pile. At the second sampling, the pH value had increased to 6.2 and the discharge exhibited a net alkalinity of 223 mg/l. However, for both samples, the total iron concentration was 50 mg/l. The pond was completed before the third visit and was containing the water from the pile.

The main refuse pile was located on the hillside north of the Loveridge preparation plant. A total of three samples were collected from the base of this refuse pile. From March through October, the pH value increased from 3.3 to 7.2, and an initial net acidity of 845 mg/l was entirely depleted with a resultant net alkalinity of 170 mg/l. Correspondingly, the iron concentration decreased from an initial 55 mg/l to a concentration of 17 mg/l in October.

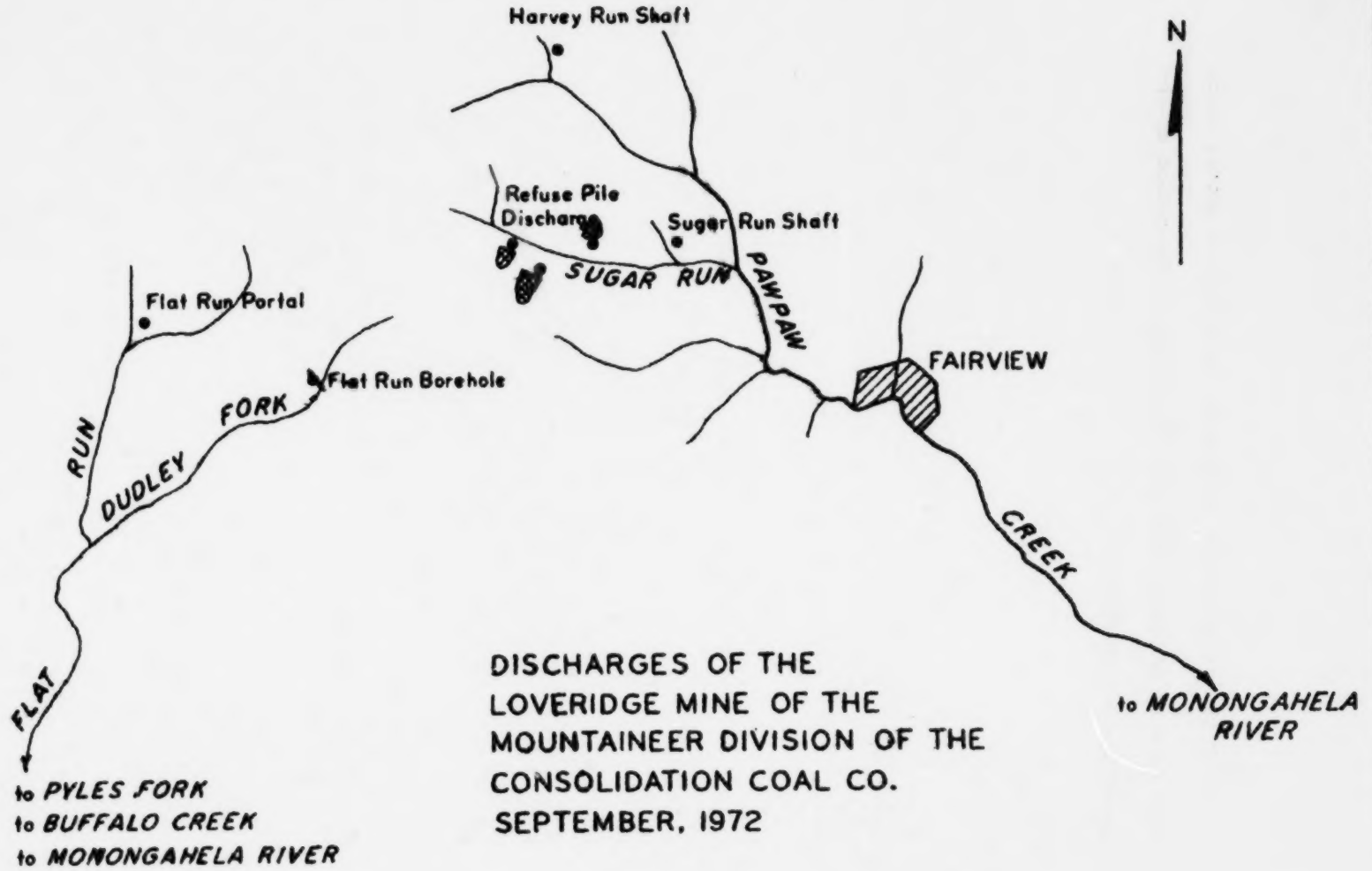
At a point on main stem Sugar Run, below all the refuse pile discharges, the stream exhibited a pH value of 6.8 and carried alkalinity and total iron concentrations of 90 mg/l and 7 mg/l, respectively.

The discharge from the Sugar Run Shaft was sampled on three occasions. The pH value remained above 7.1 with a net alkalinity above 400 mg/l at each sampling period. The total iron concentrations ranged from 2 mg/l to 5 mg/l.

The Flat Run Portal produced an alkaline discharge at both samplings. At the time of the first sample, March 1972, it carried a total iron concentration of 20 mg/l, but a value of only 1.5 mg/l was recorded at the second sampling.

The Flat Run Borehole (Dudley Shaft) was also alkaline on both sampling occasions with an average net alkalinity of approximately 150 mg/l. The total iron concentration was 5 mg/l in March 1972 and 1 mg/l in October 1972.

With the exception of holding or equalization ponds, there were no mine drainage treatment facilities in operation at the Loveridge No. 22 Mine.



DISCHARGES OF THE
LOVERIDGE MINE OF THE
MOUNTAINEER DIVISION OF THE
CONSOLIDATION COAL CO.
SEPTEMBER, 1972

A

...ridge No. ... Mine

Sample Location to Paw Paw Creek	Refuse Area Permit No.	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total ...on 3/72	Total ...on ...72
Harvey Run Shaft	191	7.2	7.9		- 3 (-78.	-666 (-480)		0 (0)	0.3 (0)
downstream			7.9			-630 (-454)			0.5 (0)
upstream		3.6	3.6		1515 (727)	225 (97)		20 (10)	35 (15
Refuse Pile (South Side Slate)		4.4	6.2*		730 (307)	-223* (-40)		50 (21)	50 (9)
downstream			6.8	7.0		36 (22)	30 (13)	20 (12)	18 (8)
Refuse Pile		3.3	6.8	7.2	845 (375)	-148 (-75)	-170 (-110)	55 (24)	17 (9)
downstream			6.8			-90 (-134)			7 (10)
Sugar Run Shaft	189	7.1	7.4	7.8	-434 (-417)	-470 (-339)	-435 (-32)	5.0 (5)	2 (1)
downstream			7.1	7.1		-141 (-440)	-93 (-91)	50 (156)	2 (2)

*Holding pond (treatment facility?) installed at this location between sample dates.

9

Ironbridge No. _ Mine

B

10/72	Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
	-7 (-78)	-666 (-480)		0 (0)	0.3 (0)		90 (104)	950 (684)		0.138	0.086	
		-630 (-454)			0.5 (0)			900 (648)			0.086	
	1515 (727)	225 (97)		20 (10)	35 (15)		(125) (60)	500 (216)		0.058	0.052	
	730 (307)	-223* (-40)		50 (21)	50* (9)		1,935 (813)	1,780* (320)		0.050	0.022*	dry
7.0		36 (22)	30 (13)	20 (12)	18 (8)			840 (514)			0.073	0.052
7.2	845 (375)	-148 (-75)	-170 (-110)	55 (24)	17 (9)	17 (10)	3,375 (1500)	2,250 (1130)		0.053	0.060	0.078
		-90 (-134)			7 (10)			1,295 (1,930)			0.179	
7.8	-434 (-417)	-470 (-339)	-435 (-32)	5.0 (5)	2 (1)	2 (0)	2,875 (2,760)	3,300 (2,380)		0.115	0.086	0.009
7.1		-141 (-440)	-93 (-91)	50 (156)	2 (2)			2,100 (6,550)			0.374	0.118

this location between sample dates.

A

Loveridge No. 22 Mine

Sample Location	Refuse Act Permit No. OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron mg/l (lb/day) 3/72	Total Iron mg/l (lb/day) 9/72	Total Iron mg/l (lb/day) 10/
to Flat Run										
upstream			7.4			-63 (-2)			0 (0)	
Flat Run Shaft	193	6.9	7.2		-75 (-87)	-201 (-58)		20 (23)	1.5 (0)	
downstream			7.6			-198 (-67)			1.0 (0)	
Flat Run Borehole (Dudley Shaft)	192	6.6	7.3		-89 (-102)	-432 (-207)		5.0 (6)	1 (1)	

Loveridge No. 22 Mine

B

Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
	-63			0			10				
	(-2)			(0)			(0)			0.003	
-75	-201		20	1.5		3,250	10				
(-87)	(-58)		(23)	(0)		(3740)	(3)		0.138	0.035	
	-198			1.0			20				
	(-67)			(0)			(7)			0.040	
-89	-432		5.0	1		2,625	4,100				
(-102)	(-207)		(6)	(1)		(3,020)	(1,970)		0.138	0.058	

Consol No. 9 Mine

Due to explosions and resultant fires, the Consol No. 9 Mine has not operated since late 1968. Any production at this mine was limited to the mining which was part of the on-going recovery operations. The discharge locations are shown in the sketch on page 99. The water quality from discharges is listed in the table on page 101.

There were three dewatering points from the mine. These were the Mods Run Portal on Mods Run and the Athas Run and Talkington Boreholes on Dunkard Mill Run. There was also surface drainage from the coal refuse disposal area on Dunkard Mill Run. Two samples were collected at each of these four sites. Both receiving streams mentioned above are tributaries to Buffalo Creek which enters the Monongahela River at Fairmont, West Virginia.

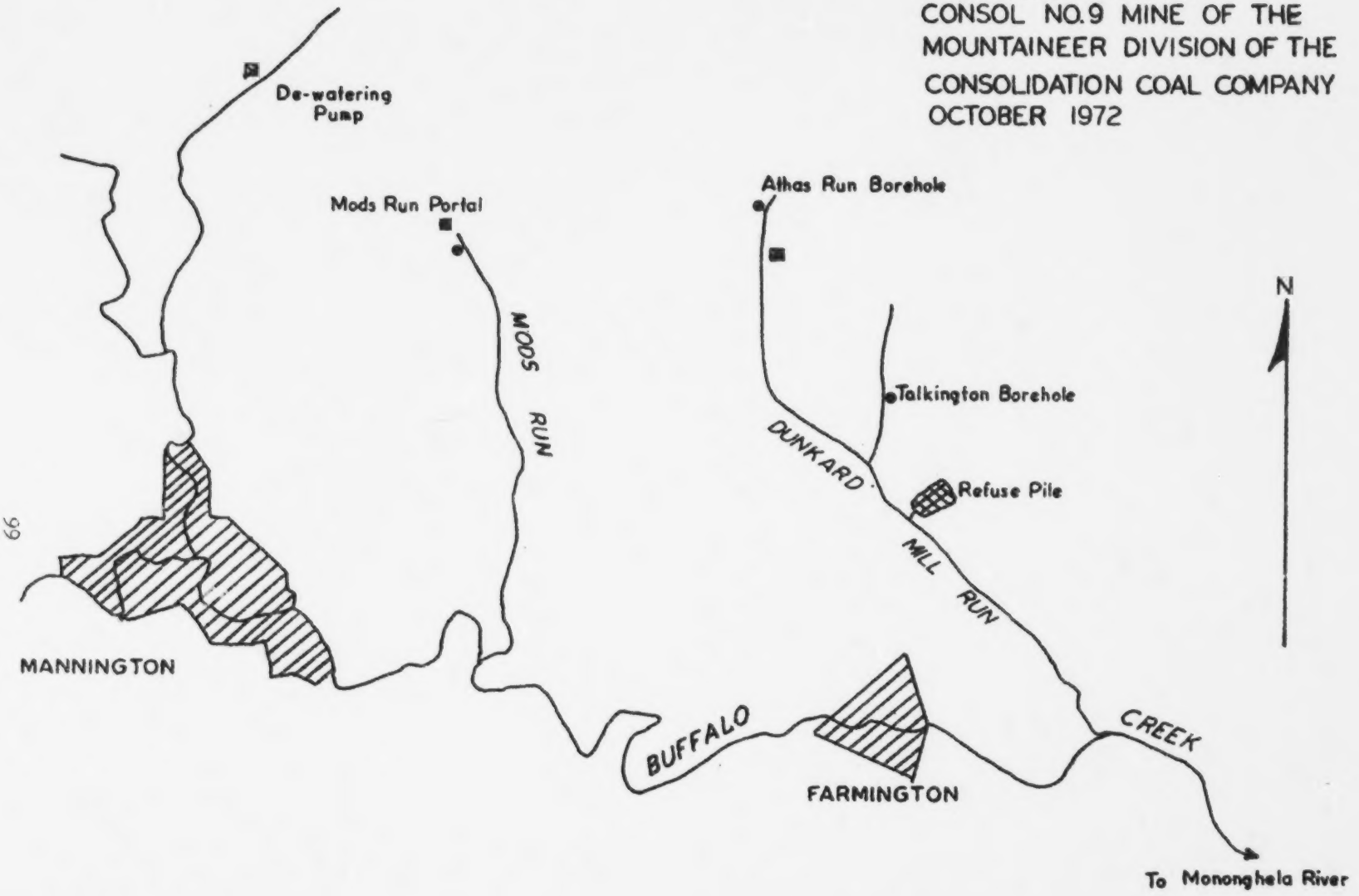
The Mods Run discharge exhibited pH values above 7.0 with net alkalinity on each sampling occasion. However, on one occasion, the total iron concentration was 10 mg/l.

The Athas Run Borehole was also alkaline on both sampling occasions, and the total iron concentration did not exceed 2 mg/l. There was no visible change in the water quality of Athas Run at a point immediately downstream of the Athas Run Borehole.

The Talkington Borehole discharge exhibited pH values of 3.3 and 5.3 and carried a net acidity at both samplings. The total iron concentration from this borehole discharge averaged 30 mg/l for the two samples.

The refuse pile discharge from the No. 9 Mine was acid at both samplings. The pH ranged from 3.9 to 5.7 while the acidity concentration averaged 135 mg/l. When the preparation plant at this site was in operation, treatment was supplied for this discharge. The treated water was then used in the coal processing procedure. When operation of the plant was halted, the treatment facility operation was also halted. The refuse pile discharge reduced the in-stream alkalinity of Dunkard Mill Run and also increased the total iron concentration in the receiving stream. However, at the time of sampling, these water quality changes were moderate.

A temporary dewatering facility was also in operation at the time of study. This pump was located on Dudley Fork. This pump had been installed to dewater a particular section of the mine where the recovering operations were proceeding. Although the total iron concentration in Dudley Fork was increased slightly, the net alkalinity of the receiving stream was increased by more than 700 mg/l. The sulfate concentration also increased from a background concentration of 840 mg/l to a downstream value of 2,350 mg/l.


DISCHARGES OF THE
CONSOL NO. 9 MINE OF THE
MOUNTAINEER DIVISION OF THE
CONSOLIDATION COAL COMPANY
OCTOBER 1972
De-watering
Pump
Mods Run Portal
MOOS RUN
Athas Run Borehole
Talkington Borehole
DUNKARD
Refuse Pile
MILL RUN
N
MANNINGTON
BUFFALO
CREEK
FARMINGTON
To Monongahela River

A

Consc No. 9 Mi

Sample Location	Refuse Act Permit No. OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron 3/72	Total Iron 9/72
to Buffalo Creek									
upstream			7.0			-173 (-135)			0.5 (0)
Dewatering Pump			7.1			-1532 (-2760)			4 (7)
downstream			7.0			-916 (-2360)			2 (5)
upstream			7.4			-110 (-4)			0.3 (0)
Mod Run Shaft	186	7.2	7.1		-95 (-28)	-399 (-43)		10 (3)	0.3 (0)
downstream			7.4			-341 (-49)			0.6 (0)
Athas Run Borehole	183	6.9	7.1		-22 (-3)	-701 (-5,050)		0 (0)	2.6 (14)
downstream			7.3			-679			3.6
Talkington Borehole	185	3.3	5.3		815 (342)	190 (0)		20 (8)	4 (0)
upstream			7.0			-62 (-110)			0.6 (1)
Refuse Pile	184	5.7	3.9		220 (106)	50 (54)		50 (24)	1 (1)
downstream			7.0			-24 (-68)			(1)

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Consc No. 9 Mi[illegible]

B

/72	Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
		-173 (-135)			0.5 (0)			840 (655)				0.094
		-1532 (-2760)			4 (7)			3,600 (6,480)				0.216
		-916 (-2360)			2 (5)			2,350 (6,060)				0.310
		-110 (-4)			0.3 (0)			50 (2)				0.004
	-95 (-28)	-399 (-43)		10 (3)	0.3 (0)		420 (126)	1,[illegible]75 ([illegible]03)		0.036		0.013
		-341 (-49)			0.6 (0)			1,350 (194)				0.017
	-22 (-3)	-701 (-5,050)		0 (0)	2.0 (14)		60 (8)	1,425 (10,300)		0.017		0.864
		-679			3.0			1,275				
	815 (342)	190 (0)		20 (8)	40 (0)		2,800 (1,180)	4,700 (0)		0.050		
		-62 (-110)			0.6 (1)			810 (1,420)				0.210
	220 (106)	50 (54)		50 (24)	10 (11)		1,485 (713)	1,890 (2,040)		0.202		0.130
		-24 (-68)			4 (11)			1,295 (3,670)				0.340

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Four States No. 20 Mine

The Four States Mine made great improvement in the quality of water discharged to streams since the visit in the spring of 1972. At that time, the main discharge point was the Main Shaft pump which discharged water through a non-functioning treatment system to Tevebaugh Creek. The pH of this discharge was 3.5, net acidity was 4,430 mg/l (8,400 lb/day) and iron was 55 mg/l (104 lb/day). Data is in the table on page 105 and locations are shown on the sketch on page 104. The field crew described the site as "the worst treatment ever". The refuse pile also discharged acidic water with a pH of 3.4, net acidity of 1,830 mg/l (3,300 lb/day) and iron of 55 mg/l (99 lb/day). Since then, the Company installed an elaborate system of pumps and pipes in the mine to remove mine water quickly to the Whetstone facility. This new neutralization, aeration and sedimentation plant treats the water to meet State criteria. The Whetstone Portal was pumping water to the creek during the spring visit, but the pH was 8.0, and it had net alkalinity and only 5 mg/l iron. Since then, this flow was also piped into the Whetstone facility. A holding pond was built at the refuse pile. This pond collected contaminated water from the refuse pile before it was pumped to a newly constructed lime neutralization, aeration and sedimentation plant at the Main Shaft. Tevebaugh Creek should soon be recovering to a much more natural water quality condition.

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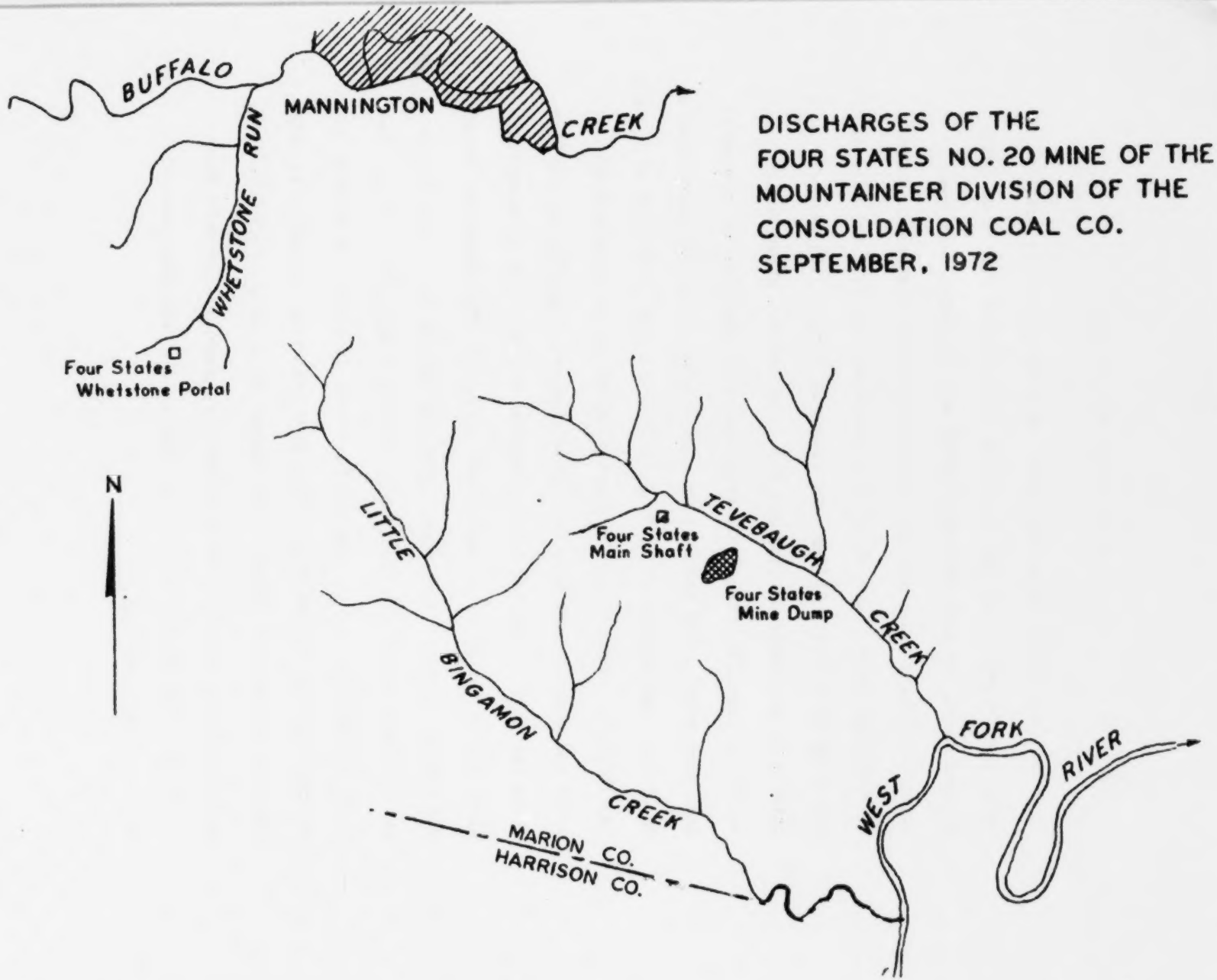

DISCHARGES OF THE
FOUR STATES NO. 20 MINE OF THE
MOUNTAINEER DIVISION OF THE
CONSOLIDATION COAL CO.
SEPTEMBER, 1972

A

Four States No. 20 Mine

Sample Location	Refuse Act Permit No.	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iro 3/72	Total Iro 9/
to Tevebaugh Creek									
Main Shaft Pump*		3.5			4,430 (8,400)			55 (104)	
Refuse Pile**	187	3.4			1,830 (3,290)			55 (99)	
Whetstone Portal***	188	8.0			-17 (-20)			5.0 (6)	

*Main Shaft water pumped to Whetstone Facility after first visit.
**Refuse Pile water held in storage pond and treated at new facility at preparation plant
***Whetstone Portal water now treated at Whetstone facility constructed during summer of 1

B

Four States No. 20 Mine

/72	Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
	4,430 (8,400)			55 (104)			12,250 (23,200)			0.228		
	1,830 (3,290)			55 (99)			3,675 (6,620)			0.216		
	-17 (-20)			5.0 (6)			95 (112)			0.141		

ity after first visit.
treated at new facility at preparation plant which recirculates its water.
tone facility constructed during summer of 1972 and no discharge yet sampled.

Williams No. 98 Mine

The Williams No. 98 Mine had two treatment facilities which provided lime neutralization, aeration and sedimentation for most of the water pumped from the mine. Water quality data is included in the table on page 111 and locations are indicated on the sketch on page 109. The Edgell facility discharged treated water with a pH slightly above 7, no net acidity and iron less than 5.0 mg/l. A nearby discharge from the Upper Coal Lick Shaft was of poor quality when first visited (pH 5.2, 520 mg/l net acidity, 375 mg/l iron) but was much improved during the second visit (pH 7.4, no net acidity, iron 4.5 mg/l).

The Levi Moore facility treated water that was once discharged from several locations. The pH of this treated discharge was high (9.5 to 10.5) and an alkaline load resulted. The average load was 1100 lb/day of net alkalinity. Iron content was below 5.0 mg/l. Bingamon Creek was only slightly discolored by the Levi Moore facility discharge. Just downstream, Bingamon Creek was discolored by the discharges from the Nutter Run Refuse Pile, the South Side Refuse Pile and the Barne Pump which were associated with the Williams Mine. The lowest iron content in any of the samples from these sources was 35 mg/l. These discharges were the major cause of the severe discoloration of Bingamon Creek downstream from this area. The Barne Pump discharge was the most acidic discharge of the group. The pH of that discharge ranged from 2.5 to 3.1, net acidity was up to 1000 mg/l and iron content was to 140 mg/l. Although this pump

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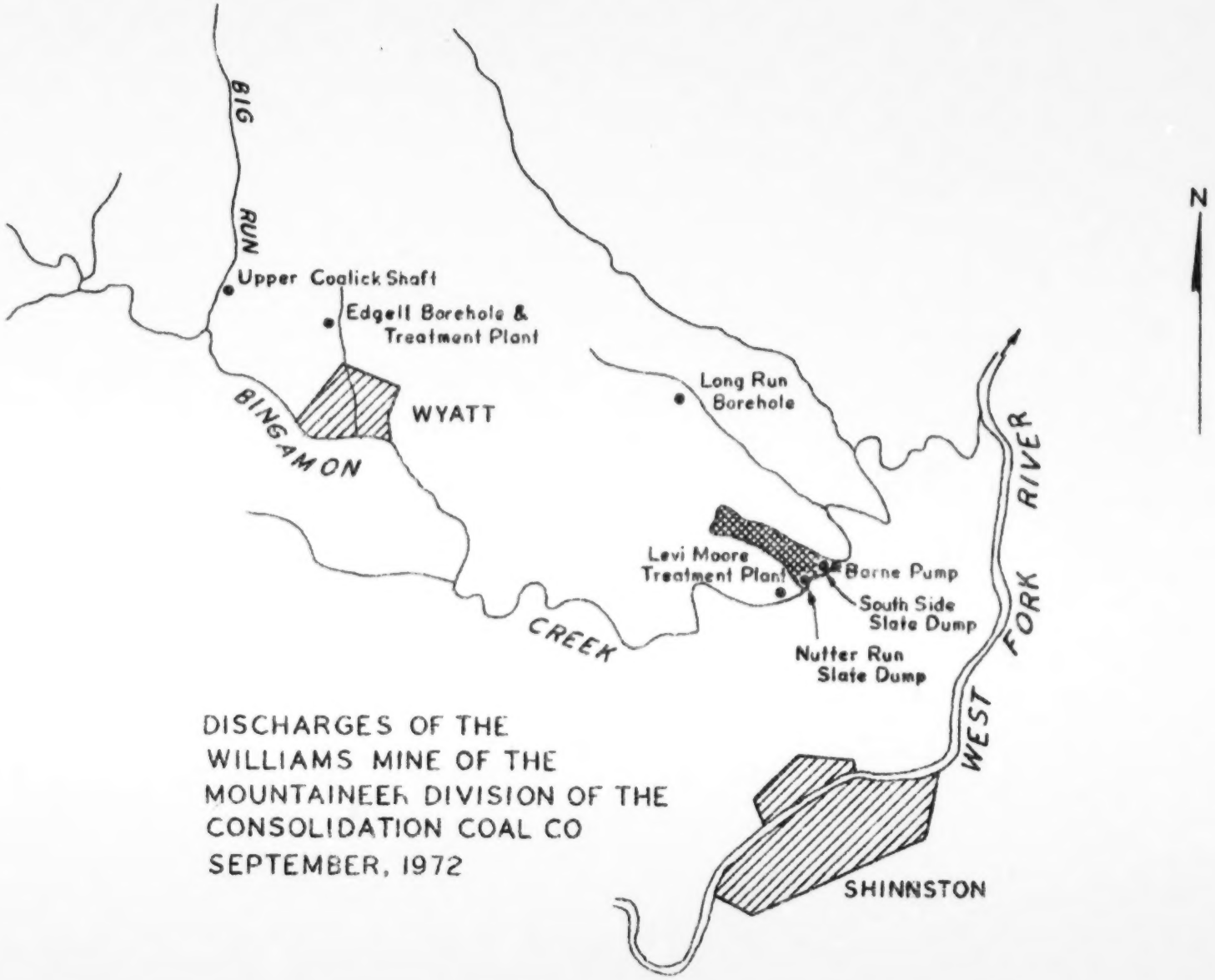
operated only for a short period each day, it caused discoloration of the entire stream at the point of discharge. The Long Run Borehole was an acidic discharge with high iron content. During summer months, this discharge was the only water flowing in Long Run. At the second visit, the discharge had a pH of 2.9, net acidity of 9,905 mg/l and iron of 2,600 mg/l.

Bingamon Creek was affected by discharges from the Williams Mine which discolored the stream and inhibited normal aquatic life in the area of the discharges and for a varying distance downstream.



DISCHARGES OF THE
WILLIAMS MINE OF THE
MOUNTAINEER DIVISION OF THE
CONSOLIDATION COAL CO
SEPTEMBER, 1972

A

Williams No. 98 Mine

Sample Location	Refuse Act Permit No. 0XJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron 3/72	Total Iron 9/72
to Bingamon Creek									
upstream			7.6			-115 (-17)			0.5 (0)
Upper Coal Lick Shaft	199	5.2	7.4		520 (686)	-161 (-15)		375 (495)	4.5 (0)
downstream			7.3			-114 (-27)			0.5 (0)
Edgell Facility	195	7.1	7.4		-81 (-972)	-36 (-346)		5.0 (60)	1.4 (13)
upstream			7.2	6.8		-76 (-1,350)	-101 (-393)		0.7 (14)
Levi Moore Facility	194	10.1	9.5	10.5	-64 (-230)	-448 (-1,820)	-400 (-1,160)	5.0 (18)	3.0 (12)
Nutter Run Refuse Pile		6.7	7.3	7.1	46 (118)	-119 (-171)	-95 (-114)	35 (90)	50 (72)
South Side Refuse Pile	201	6.1	7.0	7.2	465 (457)	68 (8)	74 (8)	52 (51)	110 (13)
Barne Pump	197	2.5	3.1	2.8	1,000 (1,020)	441 (-)	L.A.	52 (53)	-
downstream			7.8			-45 (-1,000)			3 (67)
Long Run Borehole	198	6.4	2.9		350 (189)	9,905 (6,540)		52 (28)	2,600 (1,720)
Bingamon Creek @ Mouth			6.3	7.2		24 (655)	-38 (-323)		0.8 (22)

Williams No. 98 Mine

B

/72	Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
		-115 (-17)			0.5 (0)			180 (28)			0.019	
	520 (686)	-161 (-15)		375 (495)	4.5 (0)		1,250 (1,650)	1,260 (121)		0.158	0.011	
		-114 (-27)			0.5 (0)			240 (58)			0.029	
	-81 (-972)	-36 (-346)		5.0 (60)	1.4 (13)		2,250 (27,000)	2,900 (27,800)		1.440	1.152	
8		-76 (-1,350)	-101 (-393)		0.7 (14)	1 (4)		,065 (3 ,600)			2.130	0.467
3	-64 (-230)	-448 (-1,820)	-400 (-1,160)	5.0 (18)	3.0 (12)	0 (0)	1,160 (4,180)	1,350 (5,480)		0.432	0.487	0.347
1	46 (118)	-119 (-171)	-95 (-114)	35 (90)	50 (72)	60 (72)	900 (2,310)	1,890 (2,720)		0.308	0.173	0.144
2	465 (457)	68 (8)	74 (8)	52 (51)	110 (13)	105 (11)	690 (679)	1,640 (197)		0.118	0.014	0.013
8	1,000 (1,020)	441 (-)	L.A.	52 (53)	- -	140 (-)	1,600 (1,630)	1,700 (-)		0.122		
		-45 (-1,000)			3 (67)			1,700 (38,000)			2.680	
	350 (189)	9,905 (6,540)		52 (28)	2,600 (1,720)		1,250 (675)	14,500 (9,570)		0.065	0.079	
2		24 (655)	-38 (-323)		0.8 (22)	1.0 (9)		1,750 (47,800)			3.275	1.021

Robinson Run No. 95 Mine

Water quality of discharges from the Robinson Run Mine improved from the first visit in the spring of 1972 (see table on pages 117 and 118). The three discharges to Bingamon Creek (see sketch on page 115) all had acceptable water quality with a pH from 7.0 to 9.0 and no net acidity plus iron content below 1.5 mg/l, during the second sampling period. A temporary treatment plant supplying lime neutralization, aeration and sedimentation was installed at the Cunningham Run discharge during the summer of 1972. This improved that discharge to acceptable water quality. The Oakdale Portal and the Big Indian Run Shaft produced acceptable water during both visits.

Robinson Run received discharges from the preparation plant, refuse pile and pumping operations. The Main West Borehole discharged to the headwaters of Robinson Run during the spring of 1972, but ceased discharging since then.

The Main West Fan opening ceased discharging since the Company filed for Federal permits to discharge water. The discharge from the refuse pile had a pH from 5.8 to 7.1, but contained no net acidity in any of the three samples from that point. The iron content was over 40 mg/l on each occasion and this added to the discoloration of the stream. The stream was discolored by acid mine drainage from inactive sources near its headwaters. At the time of the last sample visit, the plastic line which brought water from the refuse pile to the preparation plant was not actually recycling the water. Instead, that water was being discharged to a

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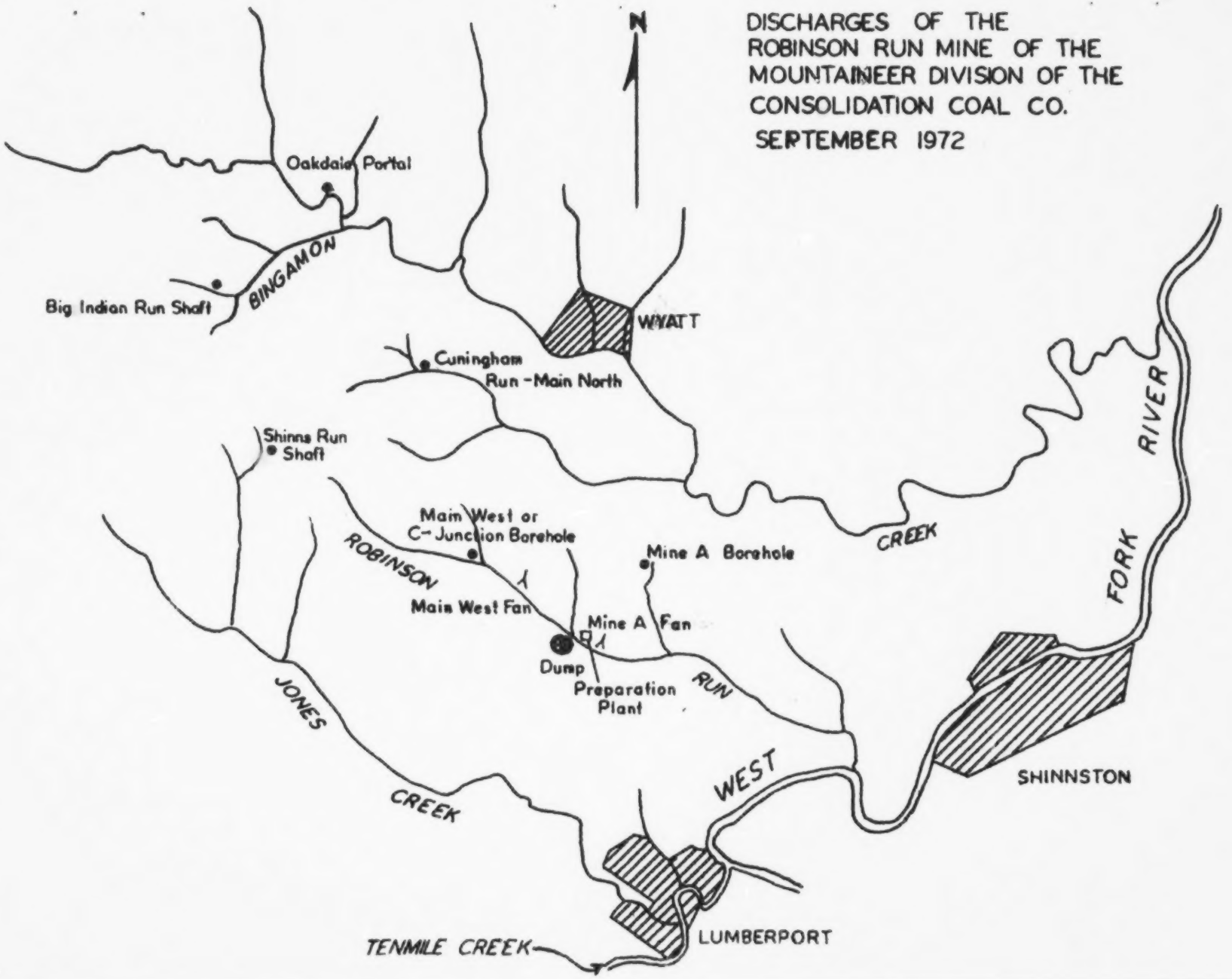
sewer at the preparation plant. The pH of that water was 7.1; there was no net acidity and the iron content was 0.5 mg/l. The Mine A Fan discharge was a problem area when first visited, but since then that discharge was eliminated. The Mine A Borehole discharged to a small tributary to Robinson Run. The discharge flowed over a regraded surface mine to a small impoundment which equalized the flow and provided sedimentation. The discharge from the borehole had a pH of 7.1, net acidity of 96 mg/l, and total iron of 95 mg/l. After flowing into the pond, the water quality changed. When first visited, the pond discharge had a pH of 3.6, net acidity of 495 mg/l, and iron of 90 mg/l. The pond discharge water quality was not this bad on the return visits. Water quality in Robinson Run was only slightly affected by the Robinson Run Mine discharges during the last sample visit.

The Shinns Run Shaft discharged directly to that small tributary to Jones Creek. The water quality was generally fair with the only problem being high iron content (up to 22 mg/l).

The only major problem discharge from the Robinson Run Mine was at Cunningham Run. The installation of the temporary treatment facility eliminated that problem.


DISCHARGES OF THE
ROBINSON RUN MINE OF THE
MOUNTAINEER DIVISION OF THE
CONSOLIDATION COAL CO.
SEPTEMBER 1972
N
Oakdale Portal
BINGAMON
Big Indian Run Shaft
WYATT
Cuningham
Run - Main North
Shinns Run
Shaft
Main West or
C- Junction Borehole
ROBINSON
Main West Fan
Mine A Borehole
Mine A Fan
Dump
Preparation
Plant
RUN
JONES
CREEK
WEST
FORK
RIVER
CREEK
SHINNSTON
TENMILE CREEK
LUMBERPORT

A

Sample Location	Refuse Act Permit No. OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron 3/72	Total Iron 9/
to Bingamon Creek									
upstream			8.0			-98 (-18)			0. (0
Oakdale Portal	222	8.2	8.7		-378 (-91)	-388 (-140)		5.0 (1)	0 (0
downstream			8.0			-270 (-146)			0. (0
Big Indian Run Shaft	211	7.6	7.7		-202 (-121)	-625 (-270)		2.0 (1)	1. (1
downstream			7.8			-504 (-218)			1. (1
Cunningham Run (Main North)	213	4.0	7.1*		405 (243)	-68* (-98)		75 (45)	1. (2
downstream			7.1			-67 (-97)			3 (4
to Robinson Run									
Main West Borehole	214	6.7			-36 (-39)			1.0 (1)	
Main West Fan	215								
upstream			7.1	6.6		106 (178)	139 (83)		70 (118
Refuse Pile	184	5.8	7.1	6.6	-7 (-4)	-170 (-61)	-161 (-38)	50 (29)	50 (18
downstream			7.1			71 (145)			53 (108

*Treatment plant installed between sample sites.

B

10/72	Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
		-98 (-18)			0.5 (0)			5 (1)			0.022	
	-378 (-91)	-388 (-140)		5.0 (1)	0 (0)		50 (12)	10 (4)		0.029	0.043	
		-270 (-146)			0.5 (0)			.5 (3)			0.065	
	-202 (-121)	-625 (-270)		2.0 (1)	1.5 (1)		30 (18)	400 (173)		0.072	0.052	
		-504 (-218)			1.5 (1)			380 (164)			0.052	
	405 (243)	-68* (-98)		75 (45)	1.5* (2)		2,870 (1,720)	2,850* (4,100)		0.072	0.173	
		-67 (-97)			3 (4)			2,625 (3,780)			0.173	
	-36 (-39)			1.0 (1)			260 (281)			0.130	dry	dry
										dry	dry	dry
6.6		106 (178)	139 (83)		70 (118)	65 (39)		1,025 (1,720)			0.202	0.072
6.6	-7 (-4)	-170 (-61)	-161 (-38)	50 (29)	50 (18)	40 (9)	1,440 (847)	1,575 (567)		0.071	0.043	0.027
		71 (145)			53 (108)			1,230 (2,510)			0.245	

A

Robinson Run No. 95 Mine (continued)

Sample Location	Refuse Act Permit No. OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron mg/l (lb/day) 3/72	Total Iron mg/l (lb/day) 9/72	Total Iron mg/l (lb/day) 10/72
Preparation Plant				7.1			-99 (-)			0.5 (-)
Mine A Fan	208	3.6	8.2		365 (219)	-113 (-24)		50 (30)	2 (0)	
downstream			7.1			62 (124)			51 (102)	
Mine A. Borehole	207			7.1			96 (-)			95 (-)
At pond downstream		3.6	5.6	4.3	495 (446)	-6 (-2)	45 (-)	90 (81)	3 (1)	2 (-)
Downstream of pond			7.0			-50 (-21)			0.5 (0)	
Robinson Run @ Mouth to Jones Creek				3.3			55 (287)			50 (261)
Shinns Run Shaft	212	7.6	6.2		-221 (-127)	-388 (-)		0 (0)	22 (-)	

un No. 95 Mine (continued)

B

Acidity mg/l (lb/day)			Total Iron mg/l (lb/day)			Sulfates mg/l (lb/day)			Flow (mgd)		
72	9/72	10/72	3/72	9/72	10/72	3/72	9/72	10/72	3/72	9/72	10/72
		-99 (-)			0.5 (-)			(-)			-
5	-113		50	2		860	1,350				
9)	(-24)		(30)	(0)		(516)	(292)		0.072	0.026	dry
	62			51			1,150				
	(124)			(102)			(2,290)			0.239	
		96 (-)			95 (-)			-			-
5	-6	45	90	3	2	1,295	2,200				
6)	(-2)	(-)	(81)	(1)	(-)	(1,170)	(792)	(-)	0.108	0.043	
	-50			0.5		1,500					
	(-21)			(0)		(630)				0.050	
		55 (287)			50 (261)						0.626
1	-388		0	22		255	3,200				
7)	(-)		(0)	(-)		(147)	(-)		0.069		

REINVESTIGATION OF EASTERN ASSOCIATED COAL CORPORATION MINES

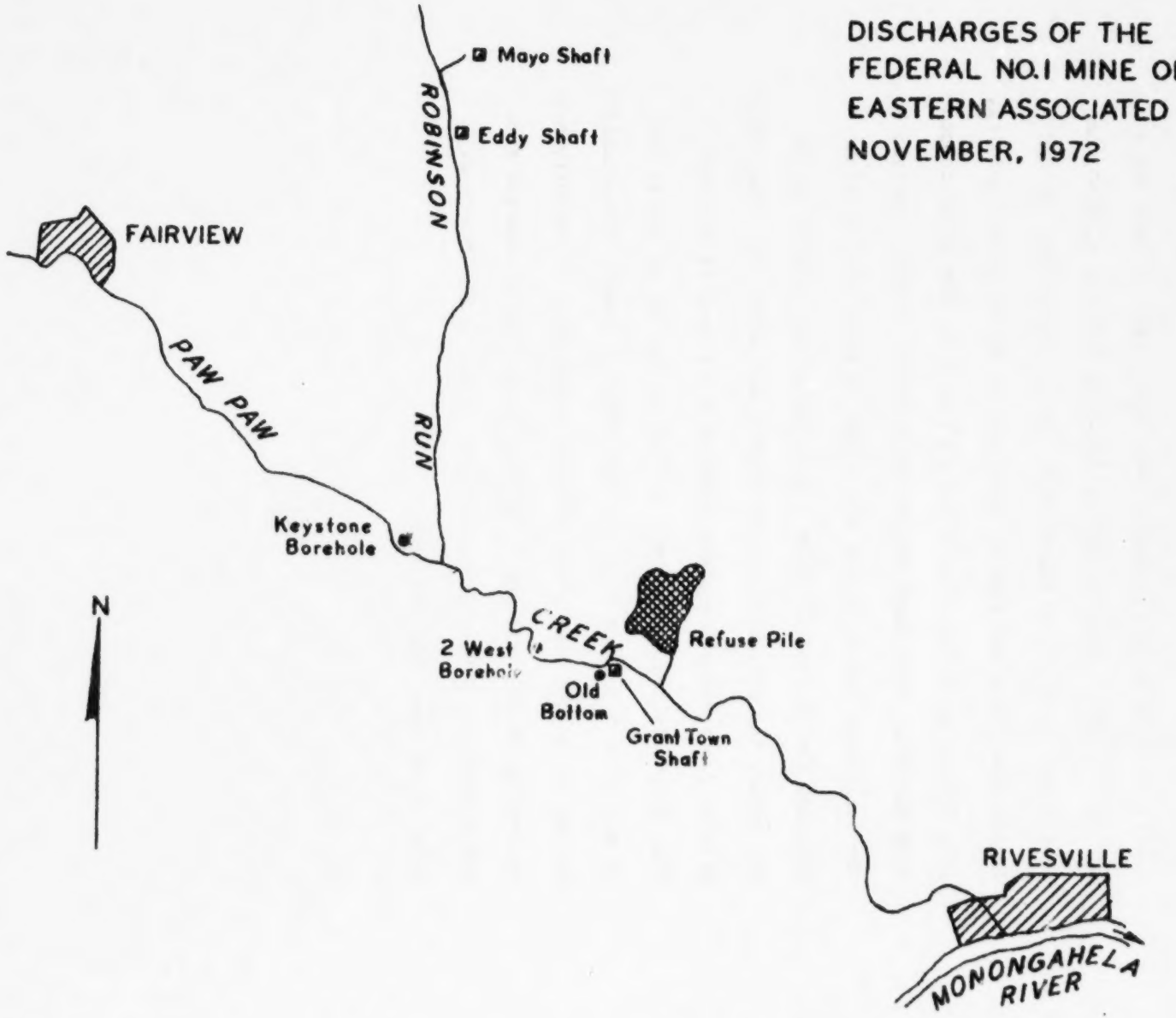
The initial survey results of the Joanne Mine and the Federal Number 1 Mine were reviewed and it was decided to investigate the discharges from these mines more thoroughly. The investigation was similar to that carried out on the Consol Mines. The Company was contacted and permission was obtained to resample the discharges and the receiving streams. The results of these investigations are presented here for each mine.

Federal No. 1 Mine

There were seven discharges to Paw Paw Creek coming from the Federal No. 1 Mine. The water quality data is listed in the table on page 123 and the locations are indicated on the sketch on page 122. The major discharge came from the Keystone Borehole. Lime neutralization, aeration and sedimentation were provided resulting in acceptable final discharge water quality. The pH was near 8.7, no net acidity was present, and the iron content was below 3 mg/l. There was no visible change in the stream as a result of the discharge.

Two shafts on Robinson Run also had a discharge. These shafts are near the longwall area of the mine. The Mayo Shaft, farthest upstream, discharged to a series of three small ponds which provided sedimentation and some aeration. At the time of the second visit, there was a low point in the dam of the first pond which allowed a portion of the raw water to by-pass the other two ponds. The pH of the raw water was 7.0, net acidity was 320 mg/l and iron was 4 mg/l. The treated discharge from the last pond had a pH of 7.1, net acidity was much lower at 39 mg/l, and the iron was down to 0.3 mg/l. The Eddy Shaft, just downstream, did not normally have a discharge. The effluent came from a water tank overflow. When the mines did not use the usual amount of water in the wash house, the water accumulated in the tank and overflowed. A drain valve at the bottom of the storage tank was opened to sample this water.

The 2-West Borehole discharged directly into Paw Paw Creek at the edge of Grant Town. The water pumped here was of good quality, having no net acidity, less than 2 mg/l of iron and a pH near 7. There were two more discharges from the mine at the preparation plant, just downstream. Water pumped from the Old Bottom area there was also of good quality having no net acidity, iron content less than 2 mg/l and a pH of 8.2. The water pumped from the Grant Town Shaft was an accumulation of water sprayed on the coal being loaded on the skip hoist to avoid dust problems. Although the pH was 7.2, iron 4 mg/l and no net acidity was in the water, the suspended solids content was excessive. The refuse pile at the preparation plant produced a low quality effluent. When first visited, the pH was 2.8 but on the second visit, the pH was up to 7.3 since lime had been added to remedy the situation. During the second visit, the effluent still had a net acidity concentration of 296 mg/l and 13 mg/l of iron. The discharges from the Federal No. 1 Mine caused visual changes in Paw Paw Creek only in the area near the outfall.


DISCHARGES OF THE
FEDERAL NO.1 MINE OF THE
EASTERN ASSOCIATED COAL CORP.
NOVEMBER, 1972
Mayo Shaft
Eddy Shaft
ROBINSON RUN
FAIRVIEW
PAW PAW
Keystone Borehole
N
CREEK
Refuse Pile
2 West Borehole
Old Bottom
Grant Town Shaft
RIVESVILLE
MONONGAHELA RIVER

A

Federal No. 1 Mine

Sample Location	Refuse Act Permit No. WV-OYJ-	pH 3/72	pH 9/72	pH 10/72	Net Acidity mg/l (lb/day) 3/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 10/72	Total Iron 3/72	Total Iron 9/7
to Paw Paw Creek									
Upstream				7.4			-45		
Keystone Borehole			8.9	8.5		-36 (-98)	-39 (-61)		3.0 (8)
Mayo Shaft Raw water leak				7.0			320		
Mayo Shaft Treated Water			6.5	7.1		-39 (-4)	39 (4)		3 (0)
Eddy Shaft			7.5	7.1		-524 (-62)	-599 (-72)		0.5 (0)
Downstream				7.2			-67 (-35)		
2-West Borehole			7.5	6.9		-480 (-58)	-396 (-48)		0.5 (0)
Old Bottom			8.2			-811 (-156)			2.0 (0)
Grant Town Shaft			7.2	7.2		-387 (-24)	-274 (-17)		
Refuse Pile			2.8	7.3		1,150 (373)	296 (47)		20 (6)
Downstream				7.5			-36 (-990)		

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Federal No. 1 Mine

B

10/72	Net Acidity mg/l (lb/day) 3/72	9/72	10/72	Total Iron mg/l (lb/day) 3/72	9/72	10/72	Sulfates mg/l (lb/day) 3/72	9/72	10/72	Flow (mgd) 3/72	9/72	10/72
7.4			-45			0.7						
8.5		-36 (-98)	-39 (-61)		3.0 (8)	1.0 (2)		4600 (12,400)			0.324	0.187
7.0			320			4						
7.1		-39 (-4)	39 (4)		3 (0)	0.3 (0)		3,100 (298)			0.012	0.01
7.1		-524 (-62)	-599 (-72)		0.5 (0)	0.5 (0)		1,500 (180)			0.015	0.014
7.2			-67 (-35)			0.7 (0)						0.062
6.9		-480 (-58)	-396 (-48)		0.5 (0)	2 (0)		1,350 (162)			0.015	0.014
		-811 (-156)			2.0 (0)			350 (67)			0.022	
7.2		-387 (-24)	-274 (-17)			4 (0)		900 (54)			0.008	0.007
7.3		1,150 (373)	296 (47)		20 (6)	13 (2)		3,000 (972)			0.039	0.019
7.5			-36 (-990)			0.2 (5)						3.3

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Joanne Mine

The Joanne Mine of the Eastern Associated Coal Corporation discharged water at three locations as illustrated on the sketch of the Joanne Mine discharges. The water quality varied widely (see sketch on page 127 and data on page 129).

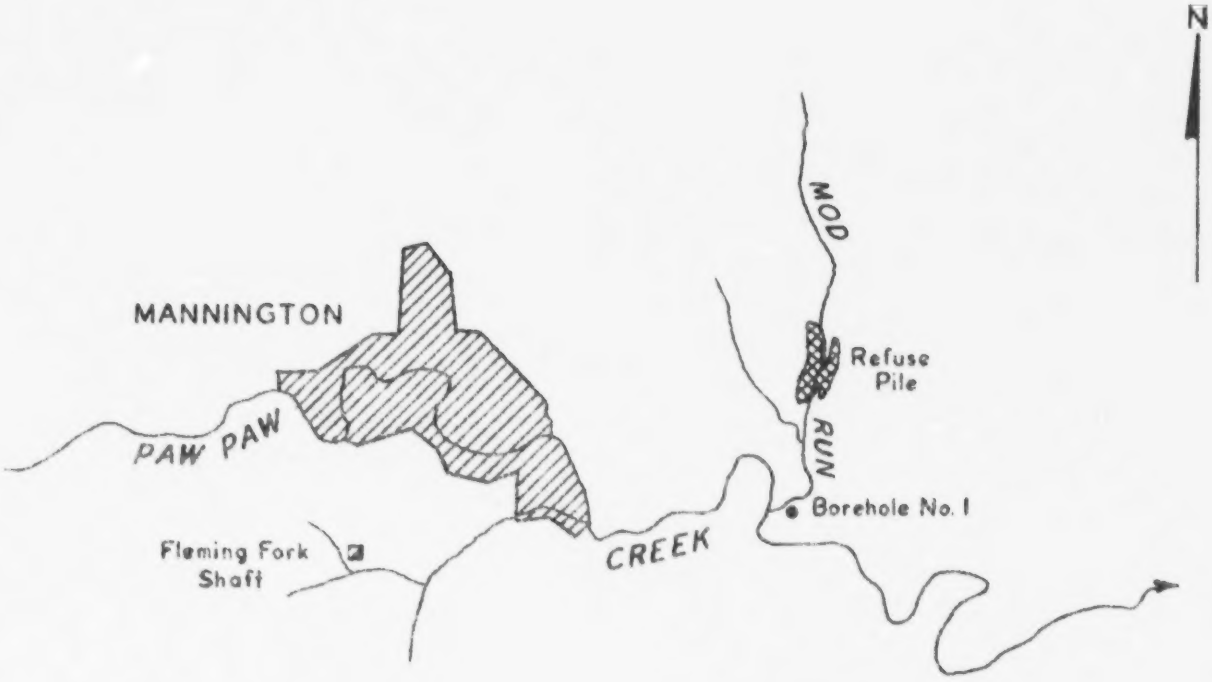
The Borehole Number 1 discharge was neutralized with caustic soda (NaOH) before entering a settling pond on the banks of Paw Paw Creek. During the first visit, the caustic was added underground in the mine and the treatment was sporadic. The underground treatment area had reportedly been flooded and had only recently been made accessible so that neutralization could be resumed. A new system on the surface was operating during the second visit. A storage tank for the liquid caustic soda had been installed on the surface near the borehole, and caustic was being pumped continuously into the pipeline carrying the mine water to the settling pond. An aerator was positioned in the settling pond near the discharge of neutralized mine water. This newly installed system of neutralization, aeration and sedimentation was operating much better than the original system. The pH of the effluent was 7.6 and there was no net acidity and iron was 5 mg/l.

The refuse piles contained settling ponds for the coal-fine slurry from the preparation plant. The slurry water was pumped through pipelines laying along the banks of Mod Run.

During the first visit, water from the refuse pile was sampled where it entered a culvert carrying it to Mod Run. The second sample taken on the first visit came from water in one of the slurry settling ponds. The higher pH of this water (7.0) was reportedly representative of the water entering these slurry ponds. At the time of the second visit, a pipeline carrying the coal slurry to the ponds was being repaired, and no discharge was coming from the pond area of the refuse pile.

The third discharge point was at the new Fleming Fork Shaft where water from the shaft walls was periodically pumped to Fleming Fork. The water quality was good, having a pH of 7.5 and 222 mg/l of net alkalinity. There was no evidence of iron staining in the stream as a result of this discharge.

Mod Run and Paw Paw Creek were visibly affected by coal fines during the second visit when the slurry pipeline was being repaired, but this was reportedly an uncommon occurrence. The effects of the Borehole discharge to Paw Paw Creek were visible only near the discharge where red-orange discoloration was noted along the streams edge.



DISCHARGES OF THE
JOANNE MINE OF THE
EASTERN ASSOCIATED COAL CORP.
NOVEMBER, 1972

A

Joanne Mine

Sample Location	Refuse Act Permit No. OXJ-	pH 9/72	pH 12/72	Net Acidity mg/l (lb/day) 9/72	Net Acidity mg/l (lb/day) 12/72	Total Iron 9/72
to Paw Paw Creek						
Fleming Fork Shaft (M-144)		7.5	-	-222 (-65)	-	L.A.
Paw Paw Creek upstream of Mod Run		-	6.8	-	-31 (-)	-
Refuse Pile on Mod Run* (M-145)		3.3		90 (22)		10 (2)
	(M-146)	7.0		-44 (-)	-	2 (-)
upstream		-	6.8	-	-24 (-)	-
Borehole No. 1 (M-142)		3.7	7.6	200 (432)	-60 (-30)	80 (173)
	(M-143)	8.9		-186 (-)		110 (-)
downstream		-	6.9	-	-29 (-)	-

*Break in slurry line to refuse pile being repaired during second visit.

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Joanne Mine

B

Net Acidity mg/l (lb/day) 9/72	12/72	Total Iron mg/l (lb/day) 9/72	12/72	Sulfates mg/l (lb/day) 9/72	12/72	Flow (mgd) 9/72	12/72
-222				10			
(-65)	-	L.A.		(3)	-	0.035	
-	-31	-	0-1	-	50	-	-
	(-)		(-)		(1)		
90		10		1,400			
(22)		(2)		(353)		0.030	
-44		2		1,215			
(-)	-	(-)		(-)		None	
	-24		3		75		
-	(-)	-	(-)	-	(9)	-	
200		80		4 300		0.259	
(432)	-60	(173)	5	(9,290)	3,950		0.504
	(-30)		(3)		1,990		
-186		110		4,000		None	
(-)		(-)		(-)			
	-29		4		120		
-	(-)	-	(-)	-	(-)	-	-

ring second visit.

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